AMERICAN
GAS JOURNAL

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On the large volume meter and regulator setting in the immediate foreground. Equipment includes two EMCO No. 5 Pressed Steel Meters and EMCO Low Pressure Balanced Valve Regulators installed on lines controlled with Nordstrom Valves.

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Against a background of fantastic Hollywood movie sets and trappings is this thoroughly practical EMCO Meter and Regulator setting that serves Metro-Goldwyn-Mayer studios with natural gas.

The motion picture industry is big business—one that uses large quantities of gas for many purposes. Like many other industries, the movie makers have found gas to be clean, convenient, economical—the fuel best suited to their needs.

The efficient application of gas can only be affected through accurate measurement and control. EMCO Industrial Metering and Regulating Equipment has for many years been performing this function with the highest degree of accuracy.

EMCO has the right combination of meter and regulator for every setting. Properly engineered pairings can be made from the most complete range of sizes and types available. Ask for the advice of our technical staff on your next industrial installation.

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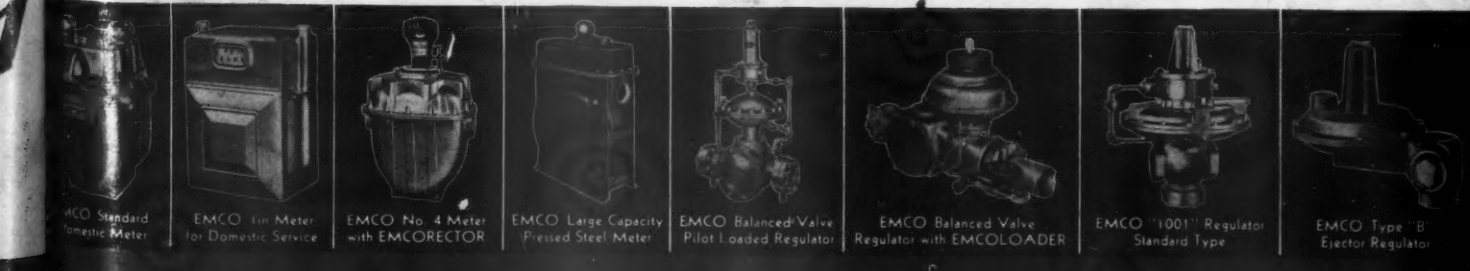
EMCO METERS AND REGULATORS



MCO Standard Domestic Meter | EMCO Type Meter for Domestic Service | EMCO No. 4 Meter with EMCORECTOR | EMCO Large Capacity Pressed Steel Meter | EMCO Balanced Valve Pilot Loaded Regulator | EMCO Balanced Valve Regulator with EMCOLOADER | EMCO "1001" Regulator Standard Type | EMCO Type "B" Ejector Regulator

There is only ONE Permaglas

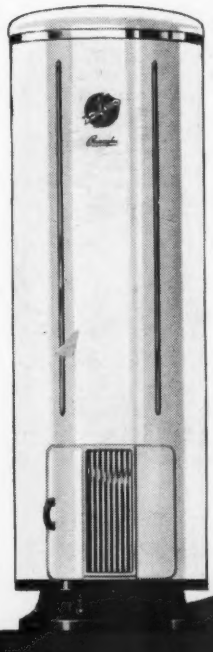
NOWHERE else in all the world does a water storage tank meet so many kinds of corrosion as in these United States — Land of Many Waters.

Soft waters from the mountains . . . hard waters of the plains . . . acid waters of the bayous . . . iron-laden waters from the ore country . . . a successful water tank must resist not one but *all* of these corrosive attacks.

So thousands of sample waters, from every state in the U. S. A., were tested and analyzed, patiently and exhaustively, before the one complete corrosion-proof tank was developed — *Permaglas.*

The result — a storage tank that defies the years and challenges geography — for *Permaglas* is impervious to corrosion in every section of the country.

That's why SMITHway water heaters, with sparkling blue, mirror-smooth, glass-fused-to-steel *Permaglas* — are America's easiest-to-sell Gas Storage Water Heaters.



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A. O. Smith Corporation,
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Please send me a copy of "The Inside Story of *Permaglas.*"

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SMITHway Permaglas
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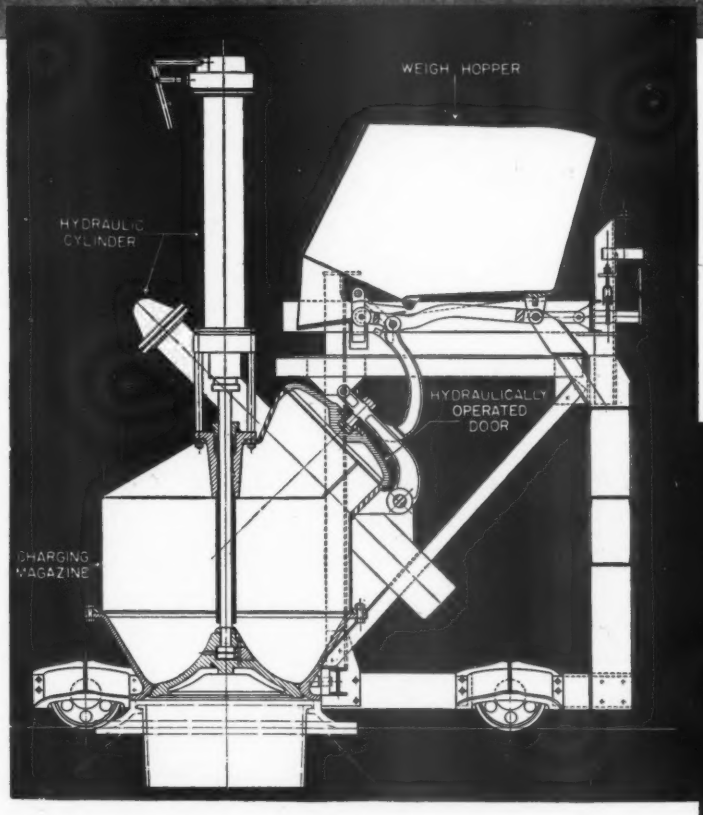
SEMET-SOLVAY *Automatic* CHARGING MACHINE



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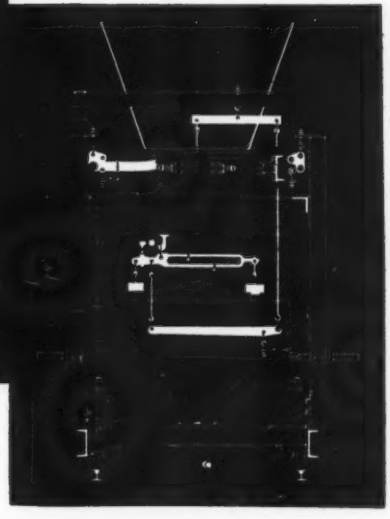

At least ten per cent increase in capacity of your water gas machine can be obtained by the addition of a Semet-Solvay Automatic Charging Machine. Part of the increase is obtained by eliminating shut-downs for charging, part from the added efficiency of a fuel bed of constant depth.

The charger refuels the generator once every cycle during the back-run period. Fuel is accurately weighed by a built-in scale and is uniformly distributed by a hydraulically-controlled spreader. A clamping device gives a gas-tight closure between charger and generator. Seating of the doors is cushioned by the hydraulic cylinders.

The Semet-Solvay Automatic Charging Machine is built for use with any make of water gas or blue gas machine. Automatic charging is not recommended however when the fuel used is bituminous coal. If you operate on coke or anthracite coal, why not write us for further information and a list of satisfied users.

SEMET-SOLVAY ENGINEERING CORPORATION

40 Rector Street New York, N. Y.

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A must in Post-War Action

Getting ready for Part 2 of the Servel Salesman Selection Program

National Group Training Sessions to begin after three final west-coast meetings

Final meetings of Servel's ten scheduled Regional Clinics on Salesman Selection will take place on the west coast during the month of February. These introductory meetings—Part 1 of the Selection Program—have met with success everywhere. Practically every Gas Company represented at these meetings has already registered sales executives in Part 2 of the program—the two-day Group Training Sessions on Salesman Selection.

At these group training sessions, sales managers and supervisors will be given a thorough background in the scientific selection of men for their sales organizations. They'll receive complete instruction and practice in the use of the Preliminary Screen, the Weighted Application Form, the Personal or Telephone Checkup, and the Patterned Interview.

In short, the Gas Company men attending these Group Training Sessions will receive not only the tools to help select the best available salesmen, but also the knowledge to effectively put these tools to work for their company's best advantage.

IF YOU HAVEN'T SIGNED UP for the Group Training Sessions, here's what to do: Make up a list of the men you want to have attend these sessions. Then get in touch with the A.G.A. Committee on Selection and Training of Sales Personnel of the Residential Gas Section, or contact your nearest Servel Regional Sales Office. They'll advise you when a training session will be held in your area. Registration of your company and other Gas Companies near you will help determine this date. So sign up today.

Register at your nearest Servel Regional Office

B. O. BROWN
Servel, Inc.
51 East 42nd Street
New York 17, N. Y.

JAMES M. CLARKE
Servel, Inc.
513-514 Union Trust Bldg.
Washington 5, D. C.

SEWARD ABBOTT
Servel, Inc.
706 Lone Star Gas Co. Bldg.
Dallas 1, Texas

C. A. MILLER
Servel, Inc.
1557 Russ Building
San Francisco 4, Calif.

A. E. LEE
Servel, Inc.
122 S. Michigan Avenue
Chicago 3, Ill.

W. K. GRUBE
Servel, Inc.
Evansville 20, Indiana

Servel, Inc.

EVANSVILLE 20, INDIANA

Ready Now, Today - The Soundest Postwar Selling Idea In Major Appliance History:

FOREWORD: *As spokesmen for the 20 manufacturers of gas ranges bearing the "CP" Seal, it is our privilege to inform the industry and the trade regarding certain postwar plans now on the way. We urge you to read every word of the following statement.*

"CP" Executive Committee, Association of Gas Appliance & Equipment Manufacturers.

* * * * *

TO THE consumer, the word "postwar" has come to mean promised miracles; products turned out by millions, at fabulously low prices, on speeded-up reconverted war-production plant assembly lines.

Shadowless lamps that need no outlets. Remote-control gadgets that cook food at the table before your eyes. Completely equipped air-conditioned homes that sell under $5,000. Heatless light and lightless heat. Everything a super-duper dream.

Some of these dream gadgets will be turned out—many of them made out of new untried materials, with little or no prewar manufacturing experience, sales "know-how" or field tests behind them.

The only question is: How well will they work?

* * * * *

It was to answer this self-same question that the famous "CP" Seal was born.

Long before this war, a group of gas range manufacturers took a long, long look at what the rest of the industry was selling. *They did not like what they saw.*

Quality was slithering down. Sales were falling off. Housewives were judging all gas ranges by price and price alone. ***The gas range business was getting nowhere – fast.***

With the help of housewives, gas industry home economists and engineers, and of designers and cooking experts, this group of manufacturers laid out specifications for a new kind of gas range and a new kind of selling procedure—identified by the "CP" Seal—***a product and a selling procedure which leading merchandisers call the soundest selling idea in major appliance history.***

Three years before Pearl Harbor, these manufacturers put gas ranges built to these new high standards into production, and this new kind of selling plan into operation.

* * * * *

The "CP" program brought remarkable results. ***It showed every retail appliance dealer in U. S. and Canada what tremendous things products built to the highest uniform standards can do for sales and profits.***

Look what happened! In three short years, sales of oven heat controlled gas ranges increased 141% as consumers started judging all ranges by "CP" standards. Sales of all gas ranges were lifted to an all-time high.

No wonder it got dealers and consumers excited! Here, for the first time, in major appliance history was a certified buying guide—a standard by which all cooking appliances could be judged.

* * * * *

What is this idea represented by the "CP" Seal?

Only gas ranges built to the highest specifications bear the "CP" Seal in addition to their own famous brand names. The "CP" Seal is the trademark of the Association of Gas Appliance & Equipment Manufacturers.

To produce the revolutionary specifications for these finest possible cooking appliances, leading gas range manufacturers, together with the gas industry's best engineers and home economists, leading designers and nutritional experts and housewives pool all their know-how, all their experience, all their ideas.

But that's not all. The "CP" Seal represents consumer protection. Gas ranges bearing this famous Seal are pre-tested by world-famous laboratories to make sure they meet the "CP" specifications.

The best and most advanced features of all cooking appliances are combined in gas ranges built to "CP" specifications. These are the finest cooking appliances it is possible to build.

No other program in the major appliance field offers such a *selling tool for you, such a buying guide for the consumer, such an act of leadership for the appliance industry.*

No other program in the major appliance field offers you such enormous potentialities for sound, profitable selling.

* * * * *

Now, see for yourself exactly what tremendous sales volume the "CP" Program offers *you*:

—At least 2 out of 3 of the ranges in your town are 10 years or more old, and ready for immediate replacement.

—Most women never saw a modern gas range—don't know what it can mean in added leisure and added economy.

—A hard hitting $12,000,000 gas industry promotion program is telling them and pre-selling them for you.

—MOST IMPORTANT: Every one of these war-wise women is looking for quality, performance, and reliability at low first and low upkeep cost. *That is another reason why the "CP" Seal will be the most important and most easily sold buying guide you ever had.*

Don't take our word for it. Ask any merchandiser.

* * * * *

Here is the biggest postwar opportunity in the appliance business. It is ready to go the minute "CP" ranges are on your floor. Already powerful and hard hitting magazine, direct mail and newspaper advertising is pre-selling your customers. ***In the works now is a complete dealer's kit showing you how to tie in and cash in with the soundest selling idea in major appliance history.***

Get your name on our list for your big 1945 "CP" dealer kit, and learn how you can plan to sell 2 out of 3 women with the soundest selling idea you ever saw.

For complete information on gas ranges bearing the "CP" Seal, and for the new 1945 "CP" Kit, write or wire the Association of Gas Appliance & Equipment Manufacturers, 60 East 42nd Street, New York 17, N. Y.

Gas Ranges Bearing The "CP" Seal Will Be Made By The Following Manufacturers:

A-B STOVES, INC.
AMERICAN STOVE CO.
CALORIC GAS STOVE WORKS
CRIBBEN & SEXTON CO.
DETROIT-MICHIGAN STOVE CO.
THE ESTATE STOVE CO.
GLENWOOD RANGE CO.
JAMES GRAHAM MFG. CO.
GRAND HOME APPLIANCE CO.
HARDWICK STOVE CO.
A. J. LINDEMANN & HOVERSON CO.
O'KEEFE & MERRITT CO.
ROBERTS & MANDER STOVE CO.
GEO. D. ROPER CORP.
STANDARD GAS EQUIPMENT CORP.
THE TAPPAN STOVE CO.
WESTERN STOVE CO., INC.
In Canada: CLARE BROS. & CO., LTD.
GURNEY FOUNDRY CO., LTD.
MOFFATS, LTD.

GAS - FIRED

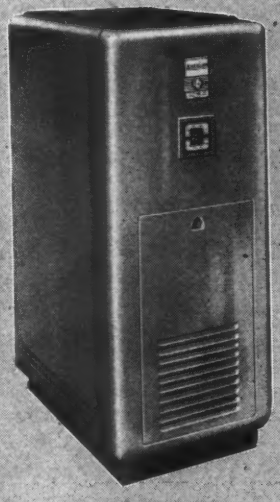
AMERICAN HEATING EQUIPMENT

BUDGET GAS FIRED WATER HEATER

Abundant hot water automatically. 3 sizes—20, 30 and 40 gals.

MOHAWK GAS FIRED WINTER AIR CONDITIONER

Completely automatic. Nine sizes—from 60,000 to 300,000 A.G.A. Btu input per hour

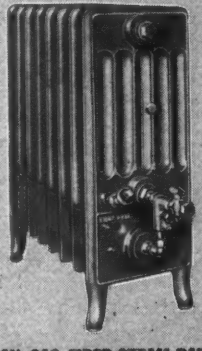


EMPIRE GAS BOILER

For small homes. Range of A.G.A. ratings: Steam, 255 to 520 sq. ft.; Water, 210 to 840 sq. ft.

EMPIRE GAS BOILER

Efficient—Attractive. For larger homes. Range of A.G.A. ratings: Steam, 610 to 1600 sq. ft.; Water, 980 to 2560 sq. ft.



AMERICAN GAS FIRED STEAM RADIATOR

Provides the comfort of radiator heating automatically. Unvented type with special Thermal control.

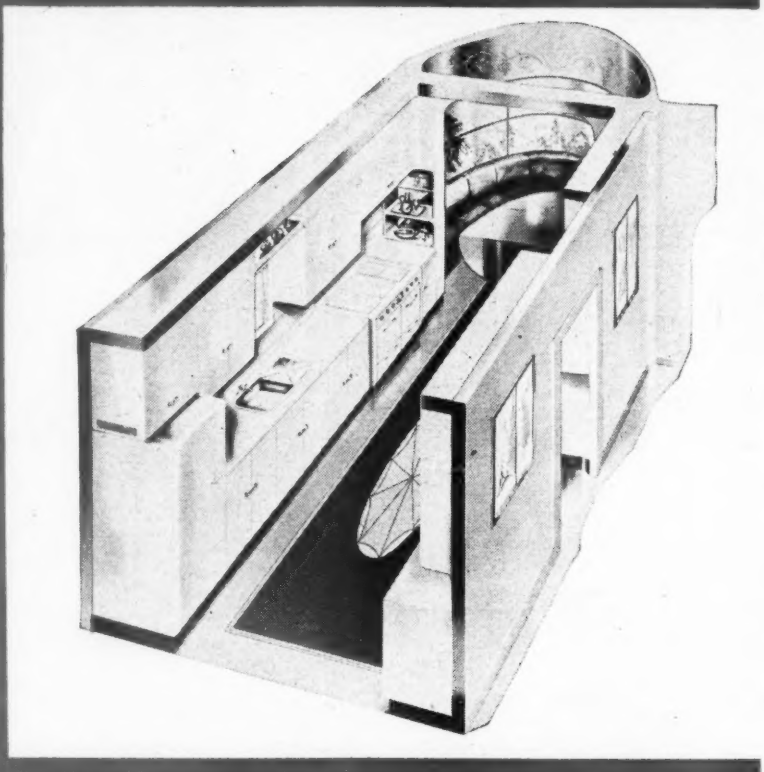
You can always count on AMERICAN Gas Fired Heating Equipment for efficient performance. These products are engineered to give the results you want your customers to enjoy in effortless comfort, economy and lasting service. Their advanced design and dependable quality will be maintained by constant research and development, so as always to merit your complete confidence.

Besides the products shown, the line includes American and Redflash Gas Convertors, Standard Gas Boilers, SUNBEAM Gas Fired Winter Air Conditioners, Gravity Furnaces and Gas Floor Furnaces. Due to war restrictions some of these are not currently available, but may be included in marketing plans for the post-war period.

AMERICAN RADIATOR & Standard Sanitary

New York CORPORATION Pittsburgh

12 GOOD REASONS WHY Magic Chef GAS RANGES Should be the HEART of Your "NEW FREEDOM" GAS KITCHENS

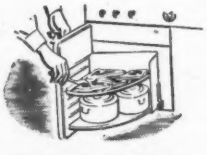


Typical example of a New Freedom gas kitchen with a Magic Chef Range.

The New Freedom gas kitchen will be a powerful factor in selling gas appliances after the war. And here are 12 good reasons why your prospects will want Magic Chef Ranges and why it will pay you to feature them as the HEART of your Gas Kitchen Program.

1 **Automatic Oven Cooking!** Simply set clock and temperature control. Gas turns on and off automatically; cooks a whole meal while you are away.

3 **Automatic Lighting!** All burners light automatically on your C.P. Magic Chef. No matches—just turn on the gas and the burner lights.



5 **Swing-Out Broiler!** Makes broiling easy—prevents smoking and food catching fire. Really easy to clean.

7 **"C.P."** The seal of approval which assures you of certified performance from your Magic Chef.

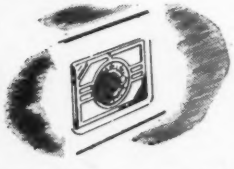
8 **Non-Clog Burners!**

9 **Magic Insulation!**

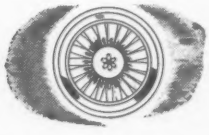
10 **Cross-Fire Oven Burner!**

11 **Easy Cleaning!**

12 **Porcelain Finish!**



2 **Red Wheel Oven Heat Regulator!** Accurate control of oven temperatures at all times. Just set regulator—better baking and roasting assured.



4 **Even Heat!** Magic Chef top burners are designed for perfect top burner cooking. Special Simmer Control for "waterless" cooking.

6 **Convenient Work Top!** The top of your Magic Chef is a convenient working surface for use when either preparing or serving foods.

AMERICAN STOVE COMPANY

4901 Perkins Avenue • Cleveland, Ohio

NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO

ST. LOUIS • ATLANTA • LOS ANGELES

Magic Chef

RED WHEEL GAS RANGES AND HEAVY DUTY GAS COOKING EQUIPMENT

Copr. 1945 American Stove Co.

FREE GAS KITCHEN NEWSPAPER AD MATS. To help you pave the way for postwar gas appliance sales, we are offering free of charge complete mats of attractive newspaper ads featuring gas kitchens. Details on these and other advertising and promotional materials on the New Freedom Gas Kitchen Program with Magic Chef Gas Ranges—available on request.

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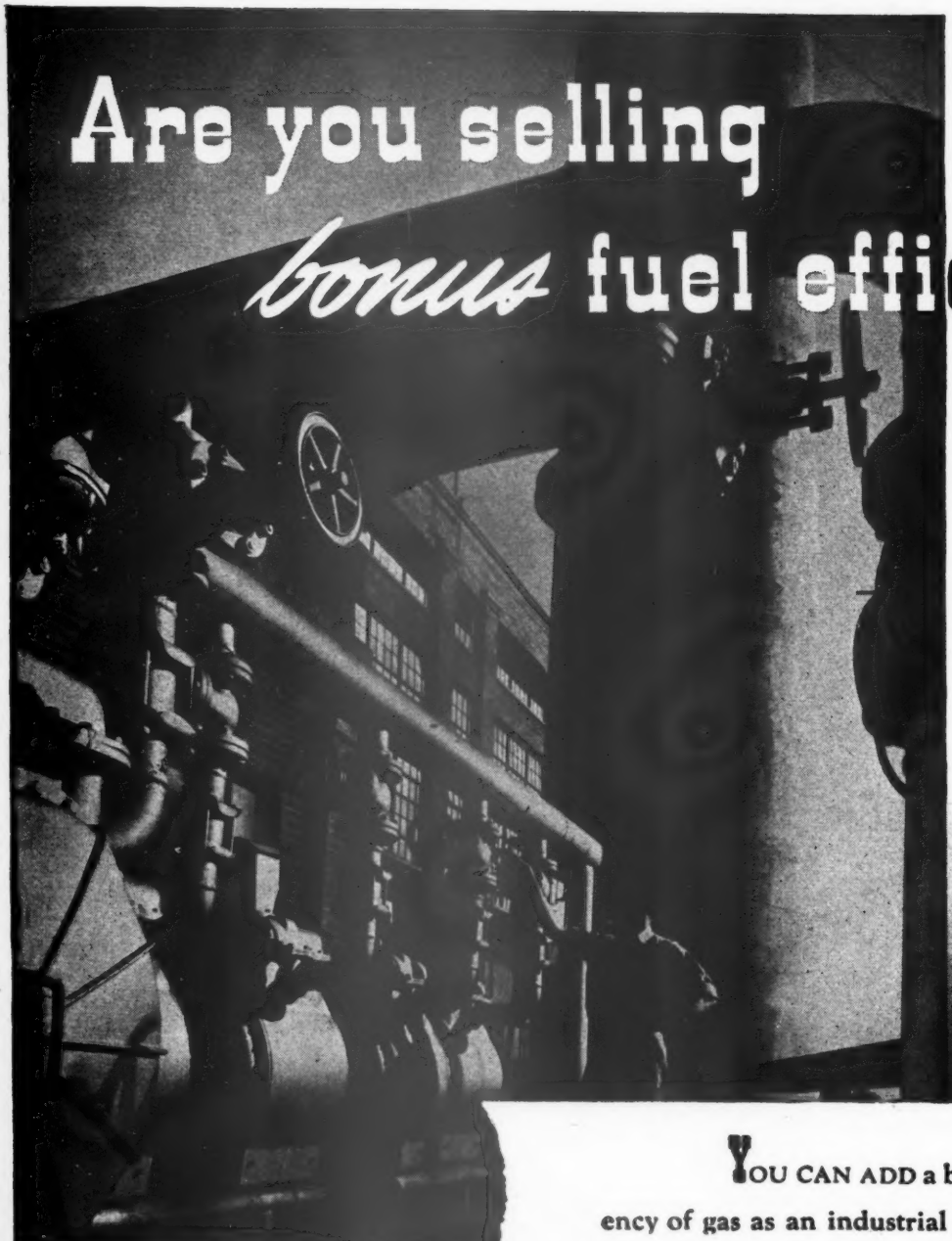

Are you selling *bonus* fuel efficiency?

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YOU CAN ADD a bonus to the efficiency of gas as an industrial fuel, and to your service, by giving your customers the many advantages of AMERICAN Ironcase Meters . . .

Full bellows diaphragms . . . provision for correct lubrication of bearings . . . one-piece body with the elimination of joints and gaskets between internal parts . . . in every feature of design and construction these rugged meters ensure accurate measurement.

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)
TINNED STEELCASE, IRONCASE & ORIFICE METERS AND REGULATORS

★ ★

AMERICAN GAS JOURNAL

FEBRUARY 1945

VOLUME 162 NO. 2

Manpower Shortage Relieved by Trained Highschool Students

By
Fred A. Herr

BEGINNING with the close of schools the last week in June, approximately 200 young men were hired for essential work to ease the company's manpower shortage. They included students from more than 30 high schools in Los Angeles, Glendale, Pasadena, Burbank, Beverly Hills, Compton and several other cities of Southern California located within the territory served by the Southern California Gas Co.

While the majority of the boys were assigned to work on maintenance and repair crews to assist in the summer maintenance program, others were placed in the pipe yard, machine shops, tool rooms and other departments in jobs requiring no specialized training or technical knowledge.

From the experiences gained when the company tried out the use of high school boys as summer workers on a small scale in 1943, Southern California Gas Co. officials concerned with personnel matters have reached several valuable conclusions:

1. . . . That athletes are preferable as summer workers to non-athletes. The boy who has been a participant in his school's sport activities, it was found by personnel department analysts, is healthier, stronger and a better all-around physical specimen. Those who played on teams—football, baseball and track, such as relay teams requiring co-ordinated effort—carry the spirit of teamwork into their jobs. Even the boys assigned to digging trenches, it was found, are inclined to regard the job foreman somewhat in the nature of a "coach" and willingly and eagerly accept advice. Boys inculcated with the spirit of teamplay are fine prospects for permanent employees of a large utility organization.

Gas companies, as well as all industries, have a manpower shortage which may last for months to come.

The Southern California Gas Co. solved a part of its manpower problem during the 1944 summer season by using several hundred high school boys for work during the vacation months. This article describes the training methods employed.—Ed.

2. . . . A brief training course to indoctrinate the student-workers in the fundamentals of their new jobs, even if only manual labor is involved, is advisable.

Boys Get Advanced Job Training

Accordingly, this year (1944), in preparation for their work during the summer just passed, all boys hired by the Southern California Gas Co. were given a full day's concentrated course of advance job training under the direction of the supervisor or foreman to whom they were assigned. The firm's decision some 18 months ago to permit executives and supervisors to take advantage of the Job Instruction Training program (J.I.T.) sponsored by the Federal government, is proving invaluable for training highschool boys and teaching them the fundamentals of their jobs in the company's 1944 plan.

Some 400 gas company supervisors and foremen, as well as a number of others in executive positions in the general offices, took the ten-hour J.I.T. course which was designed to teach them how to teach others how to do a job. Among other things, they were taught how to break down a given job into its essential factors in order to facilitate their teaching work procedures and techniques to others; and how to determine key points of a job. A key point is defined as any salient factor that might produce or contribute to an injury, simplify a practice or expedite a job. Supervisors and foremen who learned the technique of job-teaching in the J.I.T. courses put their knowledge acquired from Government instructors to practical use this past summer by instructing inexperienced highschool boys in the fundamentals of their new jobs.

Oral Teaching, Practical Work

The full-day preliminary instruction course which Southern California Gas Co. gave to newly hired highschool students was directed by H. N. Fuller, assistant superintendent of the street department. The course was divided about equally between oral instruction and practical demonstrations of ways of doing a given job. There was a two-hour discussion on production, transmission and distribution of gas by R. C. Terradell, supervisor of the company's employee training department. In the course of this talk, the boys were told how a gas company operates. Mr. Terradell told them the story of gas from its point of origin in the oil or dry-gas field, what happens to it before it enters the pipeline, and how it is handled, and why, from the time it leaves the storage holder until the customer turns on the burner of his gas range to cook himself a meal.

Talk on Safety Practices

Another part of the course consisted of a talk on safety practices by Albert W. Turner, company safety engineer. Here, the Southern California Gas Co. wisely decided to introduce the new employees to the value of precaution and the danger of carelessness on their very first day at work. The various accidents to which a worker is or may be exposed are explained by Mr. Turner; how the injury is apt to occur if certain careless practices are indulged; how accidents can be prevented by exercising specified precautions and using certain techniques which, experiences of the years have shown, will eliminate or minimize the danger of accidents. The safety factors involved on specific jobs to which certain students are assigned are outlined separately by Mr. Turner to small groups of the boys.

In the one-day training course used by the Southern California Gas Co. this past summer, the oral phase of the course was followed by a period of several hours of actual instruction by gang foremen in the use of pick, shovel and tunnel bar, and demonstrations in the use of pneumatic tools. The choice of this type of on-the-job training, of course, was dictated by the fact that most of boys working part-time this summer were assigned to maintenance crews, pipe yard and tool rooms.

The student workers were told that there is one way—the most efficient—of doing even the simplest kind of job. One of the demonstrations, for instance, dealt with shoveling. The students were told—and shown—that there is a right and a wrong way of handling a shovel so that the job may be done quicker, more efficiently and with a minimum of strain on the worker.

Job Break-Downs by Foremen

Typical of the job demonstrations was the breakdown made by the foreman teaching shoveling technique to student job applicants. The shoveling demonstration was broken down into six salient points:

1 . . . Proper way of removing the shovel from the truck.

2 . . . When and how to check location of the day's job.

3 . . . Position of hands, feet and body while shoveling.

4 . . . Filling the shovel (with sand, gravel, dirt, etc.).

5 . . . Lifting filled shovel and placing contents on spoil bank.

6 . . . Definition of key points on each of five preceding subjects.

In lifting the shovel, for example, the foreman-instructor told the boys to shift position by using the thigh as a fulcrum and elevating the pan of the shovel no higher than absolutely necessary; to give the shovel a quarter turn in shifting load from point of origin to spoil bank of trench; to keep a blank apron of at least 12 inches between the edge of the trench and the spoil bank in order to prevent removed soil from avalanching back into the trench.

Two points were emphasized in the latter respect: The sliding material might injure the worker or workers in the trench; and the workers would have to shovel the material out again.

Moral of the lesson: A too-narrow apron between spoil bank and lip of trench represents an accident hazard as well as a job-prolongation factor.

Tell and Show How to Do It

In accordance with the instructions they themselves received in the J.I.T. courses, the supervisors and foremen design their courses for the boys so as to incorporate the following essentials:

Tell them how.

Show them how.

Have a boy perform a task and then, pretending to be the instructor, tell the foreman why he is doing it a certain way and what would happen were he to do it another way.

The Southern California Gas Co. has been complimented by the directors of J.I.T. on its plan for providing a full-day's course of preliminary training and instruction for job applicants. This policy, the company was advised, fits in ideally with the J.I.T. program to train men and women to fill jobs during the war emergency and is a measure which could well be adopted by other utilities and industrial concerns faced with manpower shortage problems.

Southern California Gas Co. gang foremen are unanimous in their opinion that the J.I.T. training program, in their estimation, saved approximately two weeks of "break-in-time" on the job.

Concerning results obtained through the use of highschool boys and the company's attitude toward permanent employment of such youths, W. R. Davis, personnel manager of the Southern California Gas Co., told AMERICAN GAS JOURNAL:

"On the basis of our experience in 1943 and 1944, the boys who were able to stay with us as regular employees have developed into particularly fine workmen."

Training Geared to Needs

The concentrated course of instruction given part-time summer employees recruited from the schools represents one phase of a comprehensive job training procedure which the Southern California Gas Co. has developed, and is typical of the flexibility of the system that enables it to be geared to special needs and emergencies, as they arise.

Although employee training in various phases has been carried on for a number of years by the Southern California Gas Co., the difficulty in obtaining skilled workmen which grew more acute as the war proceeded, and other attending circumstances, have prompted the company to expand and modernize established training courses and introduce some new courses in categories of work which had theretofore not been required.

The company's job training program is conducted by the Employee Training Department, which is housed in a former distribution headquarters building at 725 Channing Street, Los Angeles.

Under a revamping of departmental facilities recently undertaken,

the Southern California Gas Co. has set aside an auditorium and has equipped five classrooms for concentrated training of men in five classifications of work. Each of the classrooms is equipped and designed to teach a particular phase of the work customer servicemen must perform.

Two of the new classrooms are located in the basement of the Channing Street building. One is devoted to instruction in the repair and maintenance of gas ranges. A collection of gas ranges, including every type the repair man is apt to encounter in the course of his work for the company, is lined up around the walls of this classroom. The ranges include modern CP models, semi-modern types and out-dated units many years old. One dates back to the first decade of the century. The purpose in making available so wide a variety of ranges is to enable the student-serviceman to familiarize himself with the construction of every conceivable type of range. The classroom also contains a sample of every type of control used on gas ranges in the company's system.

Heater Repair Taught

Another room in the basement of the Channing Street building is set aside as a classroom in which is taught gas water heater procedure. The line-up of sample heaters in this room is nearly as varied as the range setup in the other room. It includes instantaneous types, storage types and manual control types of water heaters.

The most recent classroom which the company has equipped is used for giving instructions in gas refrigeration maintenance. The room is fitted with several models of Servel gas refrigerators as well as a Servel gas-fired air conditioning unit.

Space heating appliance maintenance is taught in a fourth classroom which is equipped with various types of space heaters. The emphasis in this class is placed on outmoded types of heaters, because the chief source of trouble in the maintenance and adjustment of gas heaters, it has been found, comes from antiquated installations and not from modern heating units.

Meter installations and change is taught in the fifth classroom. This room contains all the types of ordinary domestic meters, together with connections and gas regulators. Each meter is connected to a standard meter assembly, either singly or in manifold, and actual working conditions are simulated by having the assemblies connected to a system containing odorized compressed air.

Gas Transmission Class

While the firm's employee training department has as one of its principal functions the task of teaching customer servicemen how to win friends and influence gas users, the department's training program is not confined to servicemen. The instructors also conduct classes for the distribution, natural gas transmission, production and customers departments as well as for any other department that requires employee training. The highschool boys' course was an example of how the department can adapt its facilities and staff to circumstances outside established routine.

Other functions of the employee training department include the giving of instructions in welding and the preparation and delivery of a year-round series of lectures and demonstrations for plumbers on subjects dealing with water heater and other gas appliances which plumbers install. One of the jobs of the employee training department during the early years of the war was to teach 26,000 air raid wardens how to handle air raid incidents involving natural gas installations.

Another program of instruction recently carried out by this department involved training courses for personnel assigned to the company's newly created butadiene department, which deals with the operation of the butadiene plant in Los Angeles.

30 Day Training Courses

With the installation of the classrooms, Southern California Gas Co. has introduced various changes in its employee training program which are designed to place job instruction on a more systematized basis, founded on proven experiences, which have made it possible to reduce the training period for the major job classifications from a former maximum of 90 days to about 30 days. Prior to the establishment of the classrooms, the instruction consisted of a combination of field and classroom work. Under this method, the training period covered approximately 90 days, during which time the employee training department had access to the trainee only about 20% of the time. The balance of the period the new man spent as an apprentice on the job. This "field" phase of the training program has been eliminated since the classrooms were installed, wherein actual work equivalent to field experience can now be given with greater facilities; as a consequence of this change, the training course is now reduced to the equivalent of four weeks.

The company's training program usually begins with a series of orientation talks which are planned to enable the student-employee to familiarize himself with the geographical layout of the firm, the location of various headquarters and departments, to indoctrinate him in company policies and operational methods, and give him a general background of information which will enable him to gauge his own position in the general pattern of the organization.

Tear Down, Reassemble Appliances

Explanation, demonstration and manipulation constitute the three major divisions of instruction as conducted in the classrooms at present. The trainees are required to tear down, reassemble and adjust gas ranges, water heaters, refrigerators, etc.

The Southern California Gas Co.'s employee training department is headed by R. C. Terradell as supervisor, with C. C. Westmoreland as administrative assistant. Five instructors handle the customer serviceman classes; one is assigned to the butadiene class; two to welding teaching and training; and one to bringing instruction to gas appliance dealers, plumbers and other outside groups in allied industries.

The employee training department also has a staff of six office women working under Mr. Westmoreland. They attend to keeping of training records, progress reports, adaptability charts and graphs, and other records the department prepares to enable it to follow the progress of trainees and determine the value of various training practices and procedures.

Methods of Cleaning Building Services

A Symposium

AT A MEETING of the Operating Division of the New England Gas Assn., held in Boston, January 10th, one of the subjects discussed was "Methods of Cleaning Building Services."

Papers in the symposium were presented by:

T. J. Perry, Superintendent of Customer Service Division, Brooklyn Union Gas Company, Brooklyn, N. Y.

F. A. Engel, Superintendent of Distribution, The Elizabethtown (N.J.) Consolidated Gas Company.

E. S. Umstead, Engineer of Distribution, the Providence Gas Company, Providence, R. I.

J. R. Beccia, The Connecticut Light and Power Company, Waterbury, Conn.

The first three papers follow.

Clearing Stoppages from Gas Services By Means of Vacuum

By T. J. Perry

CLEARING service stoppages is not a new topic but the idea of clearing them by removing foreign materials from them may be considered a recent development when compared with the older method of pushing these troublesome materials back into the mains by one means or another. Perhaps we should call the newer method "cleaning" instead of "clearing." Both methods have advantages since proper disposal of the material depends upon its nature. Water, for example, may be forced back into the main where it will flow to the nearest drip and be subsequently removed in quantity by drip trucks, but the type of stoppage we are dealing with here consists of hard, heavy materials which analyses indicate are chiefly composed of ferric oxide. An analysis of a sample of the kind of material I refer to is quoted to indicate that it packs very tightly, becomes hard and is extremely difficult to remove. The sample may or may not be representative since we also encounter other types of materials which cause service stoppages, but they are not pertinent to this discussion.

Sample of material removed from service Analysis	
Moisture and light oil	2.76%
Heavy oil and gum	2.15
Ferric oxide, Fe_2O_3	80.94
Sand, SiO_2	0.90
Water of hydration, by difference	13.25
	100.00%

Service stoppages first come to our attention when the customer complains of poor gas supply or that the supply has failed altogether. It is necessary to send a serviceman to investigate the complaint since the customer is hardly in a position to give much detail about it. Frequently the cause of the complaint is found to be trifling and the serviceman corrects it without difficulty and with little inconvenience to the customer, but when a stoppage occurs in the service the situation is more complex. Since we do not permit a lone serviceman to correct service stoppages, our practice requires him to report his findings to his dispatcher who sends a crew of two men to the premises. They complete most of their jobs but fail in a small percentage of the more stubborn cases and these are the jobs we are discussing today.

Before the development of our vacuum cleaning unit these stubborn cases on which the two-man crews failed would be turned over to our Street Department who found it necessary to install new services in many instances. This was unsatisfactory because installation of a new service is in the nature of a major operation of costly proportions. The work depends a good deal upon the weather, city permits to open streets, etc. and currently a shortage of manpower because of war-time conditions. These things are time-consuming and costly and add up to the most serious objection which is from the point of view of the customer who must remain without his normal gas supply for varying periods of time ranging from several days to several weeks. The vacuum cleaning unit has reduced the time element to a matter of hours and materially reduced the cost of correcting those stubborn stoppages which the service crews could not clear.

It has been our practice to break these stoppages with a snake or Sanger waste rod supplemented by the use of a hand pressure pump using a small quantity of air designed to give the stoppage a sharp jolt to release it. When the stoppage is broken the pressure of gas behind it forces the materials out through the cellar end of the service where they can be trapped in a disposal can or otherwise disposed of. More often than not, however, the pressure pump drives these materials back into the main. We have also found that the hand pressure pump frequently packs these materials tighter and consequently more difficult to remove. Sometimes the materials were pushed out to the tee at the main and could not be moved beyond that point. These developments have caused us to use the hand pump less frequently and only in those cases where the men are sure that it will not make the condition worse.

For some time we have looked for an improved method of correcting these conditions. We have found compressed air used in some instances either by compressing the air in tanks or through the use of a compressor. In one instance at least we found a company who compresses their own gas in small tanks which enables them to apply higher pressures to the stoppage than we could obtain with a hand pump and with the additional advantage that they were discharging their own gas into the service and main instead of air. Live steam and undoubtedly many other methods that I am not familiar with have been tried.

These improved methods involve additional expense in the way of tanks, compressing operations, etc., but still retained the undesirable feature of failing to remove the foreign materials. The method we were seeking was one whereby these materials could be removed from the service and not be pushed back into

our mains. Such a method would save a good many service replacements and provide a better and quicker service to the customer at less cost to us. Therefore, we were opposed to investing more money in any method which still pushed these materials back into our mains to cause stoppages elsewhere in services, mains, appliance controls or pilots.

We found justification for our search in the fact that gas services represent an important part of our capital structure, approximately 10%, and any improvement in maintenance operations is desirable not only from this standpoint but also from the standpoint of good customer relations. A great deal of maintenance work has been done on services to correct exposed portions and reduce winter freeze-ups with the result that this type of service stoppage does not occur as frequently as in the past. Dryer gas has also been an important agent in this accomplishment, but since every action has its reaction we find ourselves dealing with a type of service stoppage which, although occurring less frequently than freeze-ups, is certainly more difficult to correct through ordinary methods.

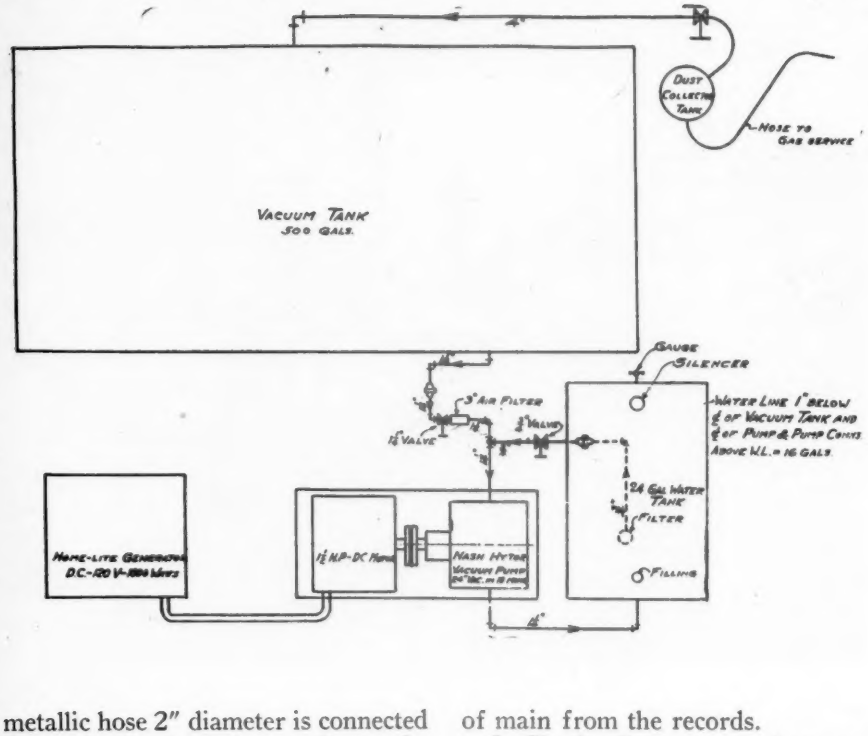
It is important that those responsible for the maintenance of mains and services exercise the utmost diligence in their stewardship and no one is more diligent than our Engineer of Distribution, Mr. C. S. Goldsmith, who early in 1944 learned that a method of the kind we were seeking was being used by Public Service Corporation of New Jersey. His investigations showed that the Public Service Corporation had been using the vacuum method with sufficient success to warrant a trial by us. Since the war imposed restriction on equipment and materials for building apparatus, we had to make the best use of such equipment and materials as we had on hand with the result that our first vacuum unit was something of a make-shift. It consisted of a 500 gallon tank which we had on hand, lengths of pipe, hoses, etc. We mounted these on a platform type truck but since we did not have a vacuum pump it was necessary to assign a street compressor for the trial. This made it necessary to use two automotive units but we decided to do this since the result promised to be worth the effort. We were particularly fearsome that pulling a vacuum on a service might put out pilots in adjoining buildings and we watched this phase of the work very carefully. It did not take long to prove that our fears of pilot outages were groundless. The trial proved successful and we then obtained permission to build an improved unit which eliminated the street compressor and two men. The present unit is mounted on a single truck, manned by a serviceman, helper and chauffeur who also acts as helper. The unit is briefly described below:

The side and rear view of truck show:

1. Dust Collector
2. Vacuum Tank
3. Water Tank
4. Vacuum Pump
5. Generator
6. Silencer

A Model HR Homelite generator, gasoline driven, supplies 110 volt D.C. current to an electrically driven Nash Hytor vacuum pump which operates at 1725 R.P.M. and is capable of pulling a 26″ vacuum. The inlet of the vacuum pump is connected by 1¼″ pipe through a 3″ tee, which serves as a filter, through a 1¼″ control valve and thence to the 500 gallon tank. The outlet of the vacuum pump is connected with 1¼″ piping to the top of a 20-gallon recirculating seal tank approximately ⅔ rds. full of liquid (summertime water, wintertime 2 to 1 mix of water and anti-freeze). A ¾″ recirculating seal line connects the bottom of the seal tank to the 1¼″ inlet of the pump. This seal tank is required to keep the liquid level in the pump at a distance of 1″ below the centerline of the rotor shaft and maintain the rotor in hydraulic balance.

A silencer or muffler is connected to the top of the seal tank to allow the escape of the discharged air or gases. A 2″ line runs from the 500 gallon vacuum tank through a control valve to a small baffled tank which is used to collect dirt, rust, etc., which is sucked from the service to prevent its entering the large tank, which is hard to clean. A flexible


Vacuum Tank
500 Gals.
Dust Collector Tank
Hose to Gas Service
Gauge
Silencer
3" Air Filter
Water Line 1" below ℄ of Vacuum Tank and ℄ of Pump & Pump Cones Above W.L. = 16 Gals.
Filling

metallic hose 2" diameter is connected from the head of the service to the dirt collector tank which is emptied daily.

It takes ten minutes to pull a 24" vacuum on the 500 gallon tank, and we have found that 24" of vacuum is sufficient to do the job. Then the pump is shut off and the control valve between the head of the service and the 500-gallon tank is opened. The vacuum in the tank sucks the service clear.

The approximate cost of this unit was:

1—500-Gal. tank (salvaged from an abandoned central water heating unit)	**$.20.00**
1—20-Gal. recirculating tank (also salvaged)	**10.00**
1—Homelite generator (bought about 3 years ago at a price of $300.00 for emergency street lighting and still available for this use if necessary)	**300.00**
1—Nash Hytor unit consisting of a 1½ H.P. 110 volt D.C. motor and vacuum pump, type D.M., 1725 R.P.M. at a cost of	**435.00**
The dirt collector tank, miscellaneous pipe, valves and fittings plus labor for assembling the unit cost approximately	**165.00**

The unit, therefore, cost us approximately $950.00 exclusive of the truck.

We can replace the Homelite generator and the electric motor with a gasoline driven pump when again available to further simplify the unit and its operation.

Procedure for using the vacuum unit follows:

1. Check length of service and size of main from the records.

2. Check pilots, etc., in houses on each side of service to be vacuumed as well as houses on the opposite side of the street, if the service is a long one attached to the main on the far side of the street.

3. Remove plug from service and take pressure reading.

4. Shut off service valve and disconnect meters on inlet side.

5. Check meter cocks for tightness. If cocks are not tight, remove meters and cap openings.

6. Use snake or rod to loosen stoppage.

7. Do not use pressure pump on stoppages composed of dust or rust because of the tendency of this material to pack.

8. Attach vacuum machine and remove stoppage.

9. Replace meters, turn on gas and relight appliances.

10. Check appliances in one house on each side of service if short service. Also check one house on each side of service on opposite side of street if long service.

The rod mentioned in Item # 6 is known as a "clog-out tool." It was devised by one of our Street Department men and consists of a reamer head which can be readily changed to either the auger or cutting type head. The head is connected to a series of sectional handles and is placed into the service through a gas-tight rubber gland. The rod is pushed until the head contacts the stoppage. Then, by applying pressure to the rod as the handle is turned, the head cuts its way through the stoppage.

We began the use of the vacuum unit in the latter part of July 1944 but the single unit described above has only been in service about one month. We have cleared services in all types of buildings and in congested as well as open areas without extinguishing a single pilot. During this period the unit has successfully completed 477 poor supply and no-gas complaints at services and had but fifteen cases where they were unable to complete the job necessitating further action by our Street Department.

The type of service installation on which the unit was unsuccessful is described in some of the cases below:

1. **An 1¼" service 45 ft. long was stopped. It could not be cleared with snake, pump or rod because the service pitched too close to the ceiling to attach the vacuum connection and it had to be relayed.**
2. **An 1¼" service 55 ft. long was trapped and filled with water at the low point. The vacuum pump cleared the water, but the service was badly trapped and had to be relayed.**
3. **Two 1¼" services supplying houses without cellars. Both services terminated in upright pieces of pipe about 6 ft. long with elbows at each end. Both services had to be relayed as the unit could not be applied.**

Several small services, ¾" and 1", were successfully cleared and will be useful for some time. Services in the smaller sizes may prove inadequate in the future, but postponing replacement now is an aid to our Street Department who are burdened because of the war.

This type of stoppage does not seem to occur generally throughout our territory but appears to occur most frequently in certain of the older sections. We weighed the material removed from some services and found that it averaged 3 lbs. per service. It does not follow that this average weight would remain at 3 lbs. per service under long term recording because at one case we found the stoppage caused by a stick of wood and in another case we found the stoppage caused by a wad of paper both of which the vacuum unit withdrew. However, if the average weight of rust, dust, etc., removed held at 3 lbs. then we would have removed 1,431 lbs. of materials from the 477 jobs completed and it is apparent that this much material of the type indicated could certainly prove recurringly troublesome if not removed.

We have trained six of our long term servicemen on this work, the youngest of whom is 48 years of age

with 28 years of service. These men are in charge of the operation because of their experience. The chauffeur and helper are younger men with shorter terms of service but it is important to have an experienced man in charge of the work because a man may at any time come across a freak job which requires experience to cope with.

During the period August 1st to December 31st, 1944, we completed 12,262 no-gas and poor supply complaints including the 477 jobs handled by the vacuum unit. Therefore, we are dealing with the fewest but most costly type of job in this classification and several important things are accomplished. We reduce our service maintenance costs, provide faster service to our customers and prevent subsequent complaints elsewhere by removing the foreign materials from the services.

The average cost of clearing a service with the present vacuum unit is $10.00 since the crew completes an average of three jobs plus per day. Therefore, our total cost of vacuum cleaning 477 services can be put at $4,800 and an idea of the possible economies to be gained through this method may be had from the fact that relaying 477 services might cost us approximately $38,000.

Our five months experience has convinced us that the method is satisfactory and we plan to augment the service with one additional unit sometime in the future.

The Mechanical Vacuum Cleaner

F. A. Engel

This cleaner, which is used for cleaning rust, dust, and foreign matter from old and new service pipes and small mains, is made up of a 16" x 24" lightweight cylindrical tank with a quick opening lubricated cock on a ½" rubber hose (of any length up to 100 feet) for connection to the intake manifold of any automobile. This unit is then taken into a cellar from which its ½" rubber hose is run through the cellar window for connection to the auto manifold. The meter in the cellar is then disconnected and the cleaner attached to the street service or riser pipe, by means of a 1" six foot length of reinforced rubber hose and is now ready for operation. A required amount of 30" of vacuum can be built up in about two and a half minutes from any automobile in good condition.

We then close the ½" cock in small hose to engine manifold, and then quickly open 1" lubricated cock on tank which connects hose and service pipe. This will instantly suck a large amount of dust and rust from gas service piping. This operation is repeated several times until there is no more dirt in gas pipe. The same operation is performed in cleaning house piping.

One very important thing to remember in using this system is the fact that precaution must be observed when cleaning services off small size mains, so as to prevent reduced pressure and extinguishment of pilot lights. It should also be borne in mind that when creating this vacuum, it is necessary to protect the cylinders of the automobile engine to which this tank and cleaner is attached, by the installation of a dust filter, in order to prevent damage to pistons and other parts. There is also on this vacuum line, a back pressure check valve and a 500° Fahrenheit fire screen to prevent a possible explosion in the vacuum tank. As a further precaution against backfiring of motor (which has not occurred during our years experience) we have inserted on the end of this tank, a 2½" rubber tapered explosion plug, which also serves as a medium for the discharge of accumulated matter, which in some instances has amounted to a gallon of dust and rust in an 1½" service pipe 300 feet long. Rust and pipe scale which formed on seats of governors attached to furnaces, which did not permit of positive shut-offs on same, was always a problem to overcome. This condition has now been corrected by our practice each summer of using our vacuum method to free such dust and scale from the pipes adjacent to the governor seats. Should a solid stoppage occur in our service pipes where our vacuum systems alone would be inadequate, such condition can be overcome by first using a hand operated plumbers snake and then extracting the broken particles with our vacuum cleaner. Until such time as we developed this method of vacuum cleaning, we had many repeat calls from customers complaining of the extinguishing of pilot lights on appliances.

Service Pump

E. S. Umstead and R. L. McBride

In 1944, the Providence Gas Company cleared 1080 services. 500 of these were rust; 500 water in trapped services; and 80 were frozen. Note:—In the winter of 1933-34, we had over 800 frozen services. Most of these services were 1" or 1¼" over 30 years old, and most of them were from 3" and 4" mains, 50 years old.

These services have a swing connection at the mains and are tapped ¾". They average about 40 feet, the longest being 60 feet.

We send out coke oven gas except in the cases where carbureted water gas would be distributed during an unusual peak demand.

Most of these services supply more than one meter, making it necessary to shut off and turn on several apartments.

In cases of water in trapped services, the American Meter Company service pump is attached to the ¾" opening at the head of the service tee. Two blasts of the pump will usually clear these jobs.

The rust stoppages are the result of dry rust carried into the service from the mains.

The rust collects sometimes at the head of the service in the cellar, and sometimes at the connection at the main.

The rust is either broken up with a snake or fish wire and sucked into the vacuum tank, or in some cases, a snake is used to keep the rust stirred up and it is allowed to blow from the head of the service. Due care must be taken to provide ventilation in the cellar. Sometimes, the vacuum and force pump are used alternately, and sometimes we resort to the High Pressure Large Volume Hauck Pump. This, sometimes results in complete stoppage.

By filling the service with kerosene and allowing it to stand a few hours, either a vacuum pump or High Pressure pump will usually move the stoppage. The few cases that will not respond, have to be dug up.

Services obstructed by Frost are easily cleared with alcohol, provided the obstruction is only partial so that the alcohol can run through. If the service is completely closed off by frost, they will usually respond if a generous amount of alcohol is allowed to stand in the pipe for a few hours. After the service is cleared, it is blown out with the force pump and Servone is poured in, to prevent re-occurrence of frost.

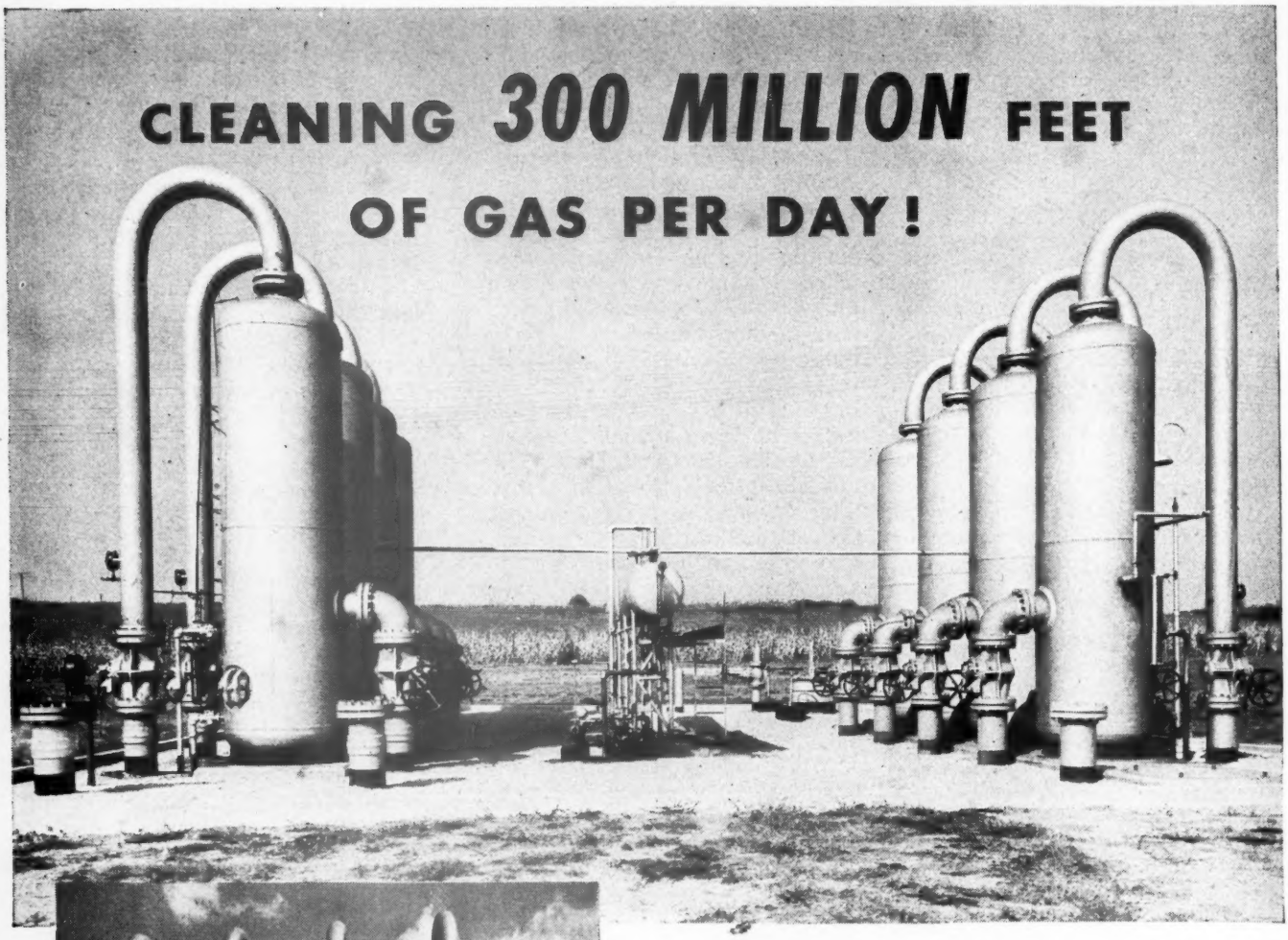
Where the water in a trapped service is frozen solid, a drill welded to the end of a ⅛" pipe rod made up in 6 foot sections is used to punch or drill through the ice. Alcohol is then poured in. After the ice is melted, the water is blown out with the force pump.

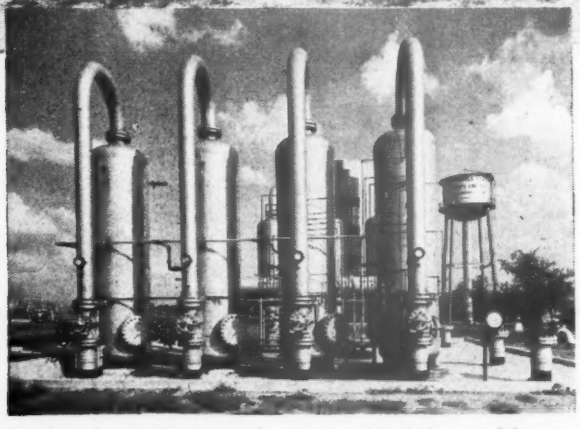
In using the drill rod, care is taken to prevent uncoupling by turning the rod in a clockwise direction.

Very few of these services have curb cock or valves to interfere with wiring.

(Concluded on page 53)

CLEANING 300 MILLION FEET OF GAS PER DAY!





In the above photograph note small piping and instruments in foreground. These make up an experimental installation to determine pressure loss... Data obtained showed a very small overall loss through the Blaw-Knox Conditioners.

The part that Blaw-Knox Gas Conditioning plays in maintaining consumer goodwill, reducing service calls and protecting equipment is daily receiving increased recognition by gas companies. Proof of this is found in repeat orders from concerns who, having proved Blaw-Knox Gas Conditioners to their own satisfaction, buy additional units. Our Bulletin No. 1578 describes Blaw-Knox Gas Conditioning equipment in detail and explains why leading operating engineers prefer it. Ask for a copy.

ARMY NAVY

7 plants of Blaw-Knox Company have been awarded the Army-Navy "E" for excellence

BLAW-KNOX GAS CLEANERS

BLAW-KNOX DIVISION of Blaw-Knox Company
2070 Farmers Bank Building, Pittsburgh, Pennsylvania

NEW YORK CHICAGO BIRMINGHAM PHILADELPHIA WASHINGTON

Gas Distribution Systems

By

W. G. Cox

Engineer

Southern California Gas Co.

THE FIRST essentials to good gas service are: (1) Continuous supply, (2) Constant heating value, and (3) Uniform pressure. To maintain uniform pressures, regulators form an integral part of any gas distribution system. Station regulators are used to regulate the pressure of gas delivered from central locations, district regulators for reducing the pressure from trunk or transmission lines to distribution districts, and house regulators for further reducing and controlling the pressure at the customer's appliances.

The process of delivering our commodity to the consumer is one that is out of sight, and its existence is only intangibly realized by the majority of consumers. Gas is an accepted fuel, and only during unusual periods, such as the recent restriction on the use of gas for various purposes during the War Emergency, do people fully appreciate the convenience and advantage of commonly accepted gas service. Because of the extreme flexibility of the distribution system, gas customers are not required to maintain cumbersome, unsightly, and messy fuel storage systems.

The establishment of an *economical* pipeline system to render this service is no accident. In the early days of the gas business and until as recently as the 1920's, the significance of efficient distribution design was not entirely recognized. During the distribution of strictly low pressure gas, it was not uncommon for the field man to size up a job and recommend 4″ pipe. The Superintendent would then review it, and, to be on the safe side, recommend the installation of 6″ pipe. The Management would approve the job, but inject further insurance by increasing the size to 8″ pipe. On the other hand, in high pressure areas this system of sizing pipes was, in many cases, reversed by taking advantage of available pressure and neglecting the possibility of future business so that in many high pressure systems, it is necessary to maintain excessively high pressures because of small diameter pipes. The installation of oversized mains represents burying capital in the ground where it can never be efficiently used, since the cost of salvaging such mains is in excess of the monetary value of the pipe.

Basically, distribution design means the selection of the proper size of pipe to render satisfactory gas service at a reasonable cost to the consumer. To efficiently design such a system or the extension of an existing system, something about consumer demand must be known. It is only necessary that this design supply the peak demand of the connected customers. One comforting fact is that there is considerable diversity in the demand for gas where fairly large groups of customers or appliances are involved. "Diversity" means simply that there is a definite spread between the *maximum* demands and the total connected load of all customers supplied by the line. The more customers or appliances under consideration increases the probability that not all of them will demand gas at the same time. Stated another way, the gas engineer banks on the theory of probability that all people will not shave, cook or take baths at the same time. Distribution design is therefore based on gambling odds and the chances the gas engineer is willing to take, as compared to the insurance he is wiling to pay for an oversized system. Accepting diversity as a fact, it would not be sound practice to use the rated connected load of customers' appliances in designing the piping layout. By using any soundly developed hourly gas usage figure, less than the rated connected load, a "design" load can be established. Particularly in high pressure systems, the gas engineer has an ace up his sleeve, so to speak, in that he can permit greater pressure drops if necessary, in the event the actual demand momentarily exceeded the design load.

Design Load

The development of a design load can be approached in several ways. One commonly accepted practice is to utilize master meters or clock meters where the number of appliances and connected loads are known, and determine the ratio between actual maximum load and connected load. This ratio can then be used on similar problems.

The consumer's characteristics in one city were studied for several years and empirical formulas developed to solve for the design load. The formula derived is:

$$D_L = \frac{Q_R}{\text{Log } (16 + A)}$$

where:

D_L = the design load
Q_R = the rated connected load
A = the number of appliances

See Proceedings, P.C.G.A., 1930, 1931, 1932 for Comprehensive Treatment of "Diversity" and Development of Design Loads.

The log (16 + A) is based on the probability odds of one in one thousand that the design load will not be exceeded. Actual tests were conducted to determine the soundness of this method of calculating design loads, and it was found by using this formula, that the average maximum demand is 12% under the calculated design load in the area under consideration.

Another practical and simple way to determine design load is to compare the peak-hour sendout of the Gas Works with the total monthly sendout. In various studies conducted around Southern California, it has been found that this ratio is between 1/260 and 1/300. To allow for unaccounted-for gas, and increase insurance somewhat, this factor has been reduced in many cases to 1/240. In spotting district regulators or designing pipe layouts for areas similar to those for which data can be obtained, it is a simple matter to take the monthly gas usage for a given group of customers and divide this figure by 240 to obtain the peak-hour design load.

A design load figure has value only for the specific problem at hand. For purposes of comparing areas and sizing mains in similar areas, it is common practice to adopt a value for a given pipeline known as the "cubic foot-per-foot" requirements. This factor, of course, is obtained by dividing the design load by the footage of pipe involved. On a comparative basis, therefore, where pipe lengths are known, the proper size pipe can be rapidly determined and tables have been prepared for this purpose.

Flow Formulas

The gas engineer can take advantage of another factor in the design of gas mains that supply services.

Flow formulas have been developed showing pipe capacities where end-to-end discharge is involved. Capacities calculated by end-to-end discharge formulas, however, do not represent the true capacity of the pipeline when services are supplied along its length. This condition has received considerable discussion and is commonly referred to as the "Augmentative Effect of Service Discharge." This means simply, that when services are discharging gas from a gas main, a multiplier can be applied to the end-to-end flow capacity of that pipe, at a given pressure drop, to obtain its true capacity. This multiplier is known as an "R" value and the number of connected services directly affect the value of "R." The value for three connected services is 1.38, for fifteen services it is 1.65, for seventy-five services it is 1.7, and for ten thousand services it is 1.73. Plotted as a curve, the value for "R" rises sharply from one service to approximately nine services and then gradually flattens out until fifteen services are connected, at which point the increased number of services appears to influence the capacity of the line very little. This theory has been checked by actual experiments on a 1,000-foot section of 2" pipe with services spaced at 20-foot intervals, and very satisfactory agreements with calculated "R" values were obtained.

Several flow formulas are available for gas engineers' use, but many prefer the Spitzglass for low pressure and the Weymouth for high pressure. These are merely matters of individual preference, and final results are within reasonable limits for distribution purposes, since values obtained by any flow formula generally fall within the same available pipe size when distribution problems are involved. The principal difference between the various formulas, is the value assigned to the friction factor. In the use of any flow formula, the ultimate generally is to determine the pipe diameter to be used under given conditions, as it is the only unknown. The specific gravity of the gas is fixed by the quality of service. The allowable pressure drop is either fixed by law, in case of low pressure, or determined by sound operating practice. The length of pipe involved is known and the demand or load can be calculated as previously mentioned.

The Spitzglass formulas when applied to a low pressure distributor, become:

$$Q = 3550\ K\ \frac{(h)^{1/2}}{(S\ldots)}\ R$$

where:

Q = quantity of gas in cubic feet per hour
h = allowable pressure drop in inches of water
S = specific gravity of the gas
L = Length of pipe in feet
R = service discharge factor
K = constant for each pipe size, obtained from the expression:

$$K = \frac{D^5}{1 + 3.6 + \frac{0.03D}{D}}$$

In low pressure flow calculations, the above factors can be reduced to a sliderule constant for a basic length pipe, such as 100 feet, tables for such constants can be developed by pipe sizes, making possible rapid flow calculations for any given problem.

Likewise sliderule constants can be developed for high pressure formulas within a given pressure drop range, considerably simplifying flow calculations.

Pipeline Classifications

The pipelines in a distribution system (excluding services) fall into three general classifications:

(1) Distributor mains are those that supply gas to customers along its length, but technically do not supply gas to any other main. Obviously the bulk of the mains in the distribution system fall in this group. In fact in the average distribution system, approximately 80% of the mains are distributors. Therefore, the efficient design of this group of mains affords the gas engineer the greatest single opportunity to establish an economical balance between justifiable risk and the reduction to a minimum of "frozen" capital resulting from the installation of oversized distributor mains.

(2) Feeder mains are those that deliver gas from a principal source, such as a district regulator, to distributor mains.

(3) Trunk lines deliver gas from a source of supply, such as the Gas Works, to centers of distribution, or district regulators.

Since the distributor merely serves customers along its length, it is only necessary to install pipe capacities sufficiently large to supply the diversified demand. The true critical distance of the distributor is from the feeder line to the last customer. Normally, it is not necessary to extend distributors past the last customer for purposes of "looping" the systems.

Load Surveys

Load surveys have been used to advantage in the establishment of uniform pressures, identifying feeder lines, and locating regulators with reference to load centers. With known loads for existing distributors, block by block, their critical distance can be calculated and a suitable cross street feeder main located within this distance. By summing the loads of the various distributors to be supplied by the feeder, its critical distance can be calculated, and, if necessary, a district regulator, supplied by a branch trunk line, can be located at the calculated end of the feeder main.

Maintenance of Distribution Systems

Discussions as to the maintenance of a distribution system could fall into as many classifications as there are elements composing that system. Because of the multiplier involved, the maintenance problems that develop in connection with mains and services predominate.

The maintenance problems of any gas distribution system will vary considerably with the average age of pipes, soil corrosivity in the area served, and the relation between wrapped and unwrapped pipe.

The first step in the development of a maintenance policy would be to analyze system records to determine the quantities of unwrapped steel pipe. Soil studies should then be conducted to ascertain the extent of the corrosive area, and the distribution of the unwrapped pipe in these areas.

The utility serving the Los Angeles Area is now engaged in a long range maintenance program, and its preliminary approach to the problem might be of interest.

For several years, a maintenance record has been kept by this utility, showing all repairs to gas mains. The visual record of these repairs was maintained on Atlas sheets covering the entire area served by the utility

Pipe Leakage

The first step toward an accelerated maintenance program was to review those areas containing corrosive soil in which bad pipe was known to exist. The mains selected for investigation were then barred at regular intervals and leakage readings taken with a Gas Leak Indicator. On the basis of these results, jobs were progressively developed to eliminate gas leakage in a given area. It might be interesting to note that at the start of the leakage investigation program,

approximately 20% of the mains barred developed into replacement or reconditioning jobs. These jobs were, of course, in those areas of known bad pipe, and it was not expected that that percentage would continue. As a by-product of the barring program, isolated leak orders developed on sections of the main not sufficiently bad to warrant replacing or reconditioning.

Joint Leakage

In addition to steel pipe within this area, there is also a considerable amount of cast iron bell and spigot joint pipe, and the maintenance of this system is primarily directed to controlling joint leakage. During the distribution of manufactured gas, the problems of cast iron joint leakage appeared to be negligible. With the introduction of dry natural gas, however, joint leakage on cast iron systems increased. This appears to be due to the dehydrating effect of the dry gas on the jute fibers making up the joint. One remedy, of course, to a leaking bell and spigot joint is the installation of a mechanical clamp. Several methods have been attempted to eliminate the necessity of excavating joints for clamping, but none of them appear, as yet, to be completely successful. Rehydration of the gas apparently eliminates to a certain extent, joint leakage, but with this process the drippage troubles of the manufactured gas days are revived.

Protective Measures

There are many avenues open for future research and development, many questions still unanswered. Gas utilities should constantly strive to improve methods for combating the effects of corrosion to their ground systems. Considerable progress has been made in the development of cathodic protection for individual pipe-lines, but no organized attempt has been made to apply this theory to the protection of distribution networks. The development of plastic pipes and other protective coatings opens fields in another direction to retarding corrosion. The application of mass production methods in pipeline installations might considerably reduce installation costs. The gas industry is rapidly recognizing that many of its methods are outmoded, and that it must apply modern production procedures to insure its continued leadership.

Abstract of paper presented before Southern California Meter Association November 16th 1944.

A Pictograph
OF EFFICIENT DUST DISTRIBUTION

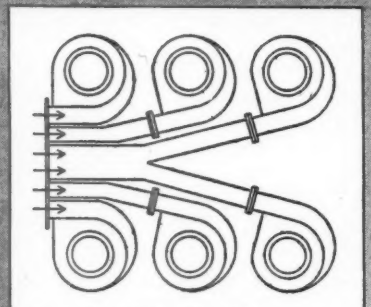


Figure 1—*Split-Duct Manifold is most efficient. Insures uniform distribution of dust and gas to all cyclones. A Buell feature.*

THE MOST EFFICIENT METHOD
(Buell's)

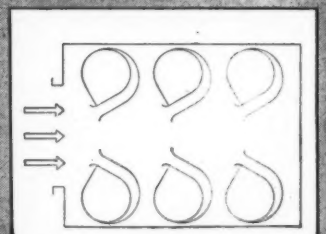
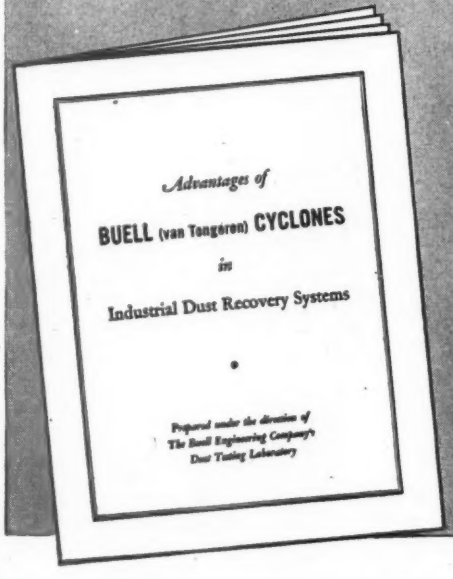


Figure 2—*Unit-Chamber Manifold, never used by Buell. Disadvantages: uneven distribution of dust to tubes, piling up of dust in rear of chamber, rapid erosion of outlet tubes.*

THE LEAST EFFICIENT METHOD
(Never used by Buell)



BOTTOM VIEW OF MANIFOLD ASSEMBLY

Every engineer and operating executive should have a copy of the bulletin shown above as his guide in the selection of the right dust collection equipment.

buell
DUST RECOVERY SYSTEMS

Buell Design ELIMINATES CLOGGING MINIMIZES EROSION

The scientific development of inlet manifolding for multiple unit cyclone dust collectors has played an all important part in the uniform distribution of both gas and dust in cyclone collectors. How proper manifolding is achieved in Buell Dust Recovery Systems is shown in the pictograph on this page. What happens when the dust load is not uniformly distributed, and how serious these disadvantages may be, is best described in the bulletin shown on this page, from which these two manifold sketches were taken.

BUELL ENGINEERING COMPANY, INC.
70 Pine Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"!

What will the gas range of

DISCUSSION NO. 12

8 Suggestions that will benefit

While devoting almost 100% of our facilities to war production, the Harper-Wyman Company has continued to look ahead to the time when production for peace is resumed. Our thinking on improvements in gas range construction has been discussed in a series of advertisements. The industry seems to be in particular agreement on eight of the subjects discussed, which are summarized in this advertisement:

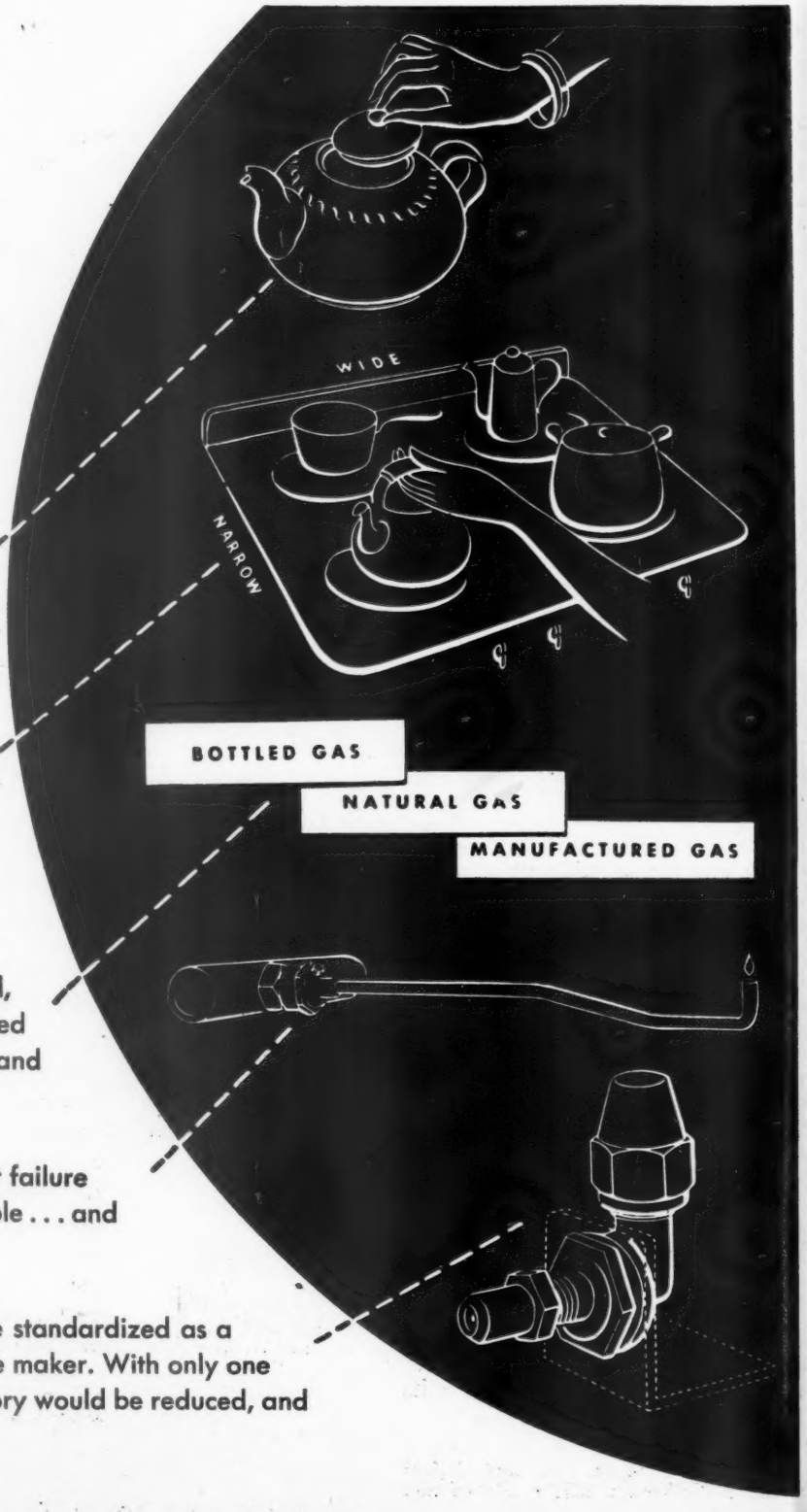
1. Improved burner heads are desirable. They should be as easy to remove as a teapot cover . . . as easy to clean as a teacup. They are on the way.

2. More convenient arrangement of top burners for the housewife is desirable, and certainly practical. We suggest short spacing front to back, preferably 8½". . . wide spacing side to side, preferably 10½".

3. Burners will be "tailored" to the gas, to give the utmost in economy, speed, flexibility for each type of gas. So-called "compromise" burners are just that . . . and their day is done.

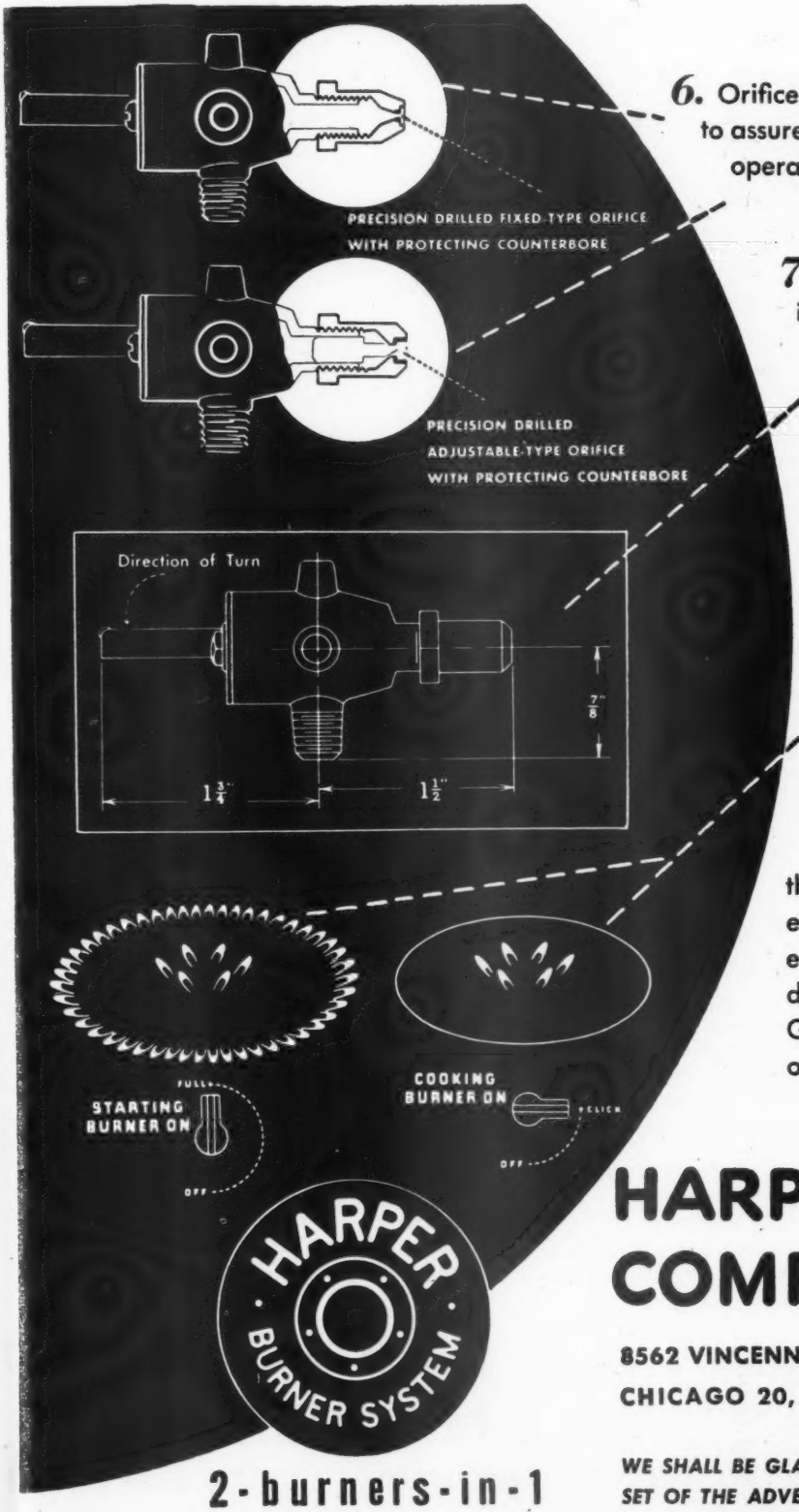
4. Non-clogging filters to eliminate pilot failure (and user irritation) are extremely desirable . . . and are available today.

5. Oven burner orifice fittings should be standardized as a time and money-saving step for the range maker. With only one design to stock, the range maker's inventory would be reduced, and orders could be filled more promptly.



the future be like . . . and WHY?

the user . . . and the industry



6. Orifices on valves must be precision-engineered to assure accuracy of flow and more dependable operation for the Gas Range of the Future.

7. Top burner valves should be standardized as to certain boundary dimensions . . . should turn counter-clockwise to open. Service will be less costly because repeat calls will be fewer.

8. Top burners will do double duty . . . and they're available now in the Harper Burner System, the only system where each burner is really 2-burners-in-1 . . . a burner within a burner, both operated and controlled by a single handle.

Those in the gas industry with an eye to the future are giving thoughtful consideration to the suggestions outlined here, each of which will undoubtedly prove of distinct value in winning new friends for Gas—the fuel that assures cool, clean, odorless cooking!

HARPER-WYMAN COMPANY

ARMY E NAVY

8562 VINCENNES AVENUE
CHICAGO 20, ILLINOIS

WE SHALL BE GLAD TO SEND YOU, WITHOUT COST, A COMPLETE SET OF THE ADVERTISEMENTS REFERRED TO HERE.

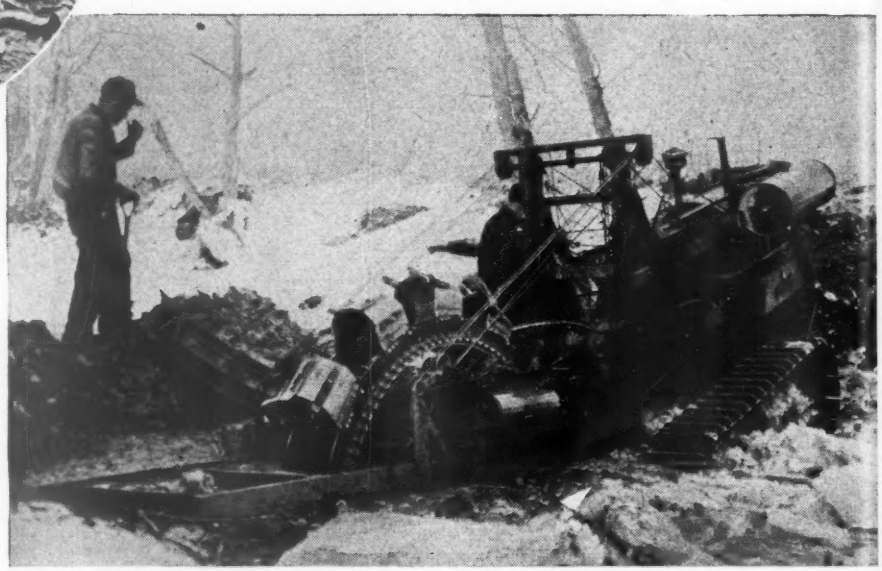
"CLEVELAND'S"

Extra Ruggedness and Power to Spare

Enable Them To Take the Toughest Trenching Jobs In Stride . . .

The numerous crawler and wheel speed combination at the operator's command, in "CLEVELANDS", permit the application of tremendous power to the digging wheel when excavating through rocks and boulders as indicated in the illustration to left.

The picture at right shows a "CLEVELAND" digging through a frozen creek bottom and up a bank without a hitch, while digging at maximum depth. Such performance requires real ruggedness.



● "CLEVELAND" appreciating that of all construction equipment none must meet tougher assignments than the trencher designs and conditions its machines to meet the roughest going in any kind of soil or terrain. For instance; in "CLEVELANDS" double-strength steel is normally used in frame, boom and buckets and the toughest, longest wearing materials are used throughout—all driving sprockets and segments of the digging wheel are of heat-treated drop forged alloy steel. Wide tread and low ground pressure, all gears in grease sealed housing and a preponderance of anti-friction bearings assure strength, endurance and stability. In fact, from the husky Gasoline or Diesel power plant to the high-capacity digging wheel you will find in CLEVELAND a toughness, a freedom from friction and a protection from wear to an unsurpassed degree.

"CLEVELANDS"
MAKE THE EARTH FLY

THE CLEVELAND TRENCHER CO.

20100 St. Clair Avenue Cleveland 17, Ohio

Chemical Control in Small Gas Plants

The Application of Results of Chemical Analysis and Methods of Translating Laboratory Control to Plant Results

Part 1

By
Joe Frink
Chemist
Florida Power & Light Co.
Miami, Fla.

THE "CP" gas range has given the gas man a small idea of the spot he will be on in the near future.

This is brought to your attention because, without a much better control of the quality of our manufactured gas, this "spot" may become what will be generally known as a "Hot Spot".

We know it's coming — we can't stop it — the appliance manufacturers can't stop it for they are competing with other fuel and must produce a super product. This leaves the gas manufacturer holding the bag, so to speak.

Now, if we as gas men are intelligently selfish in this matter of keeping gas before the public as the superior fuel, we will produce gas that gives no trouble thereby selling more and more of it, and we will produce this gas in such a way that the cost of production will be even less than before.

Chemical control of this chemical industry is the answer.

The slogan: "Keep off the 'CP' Hot Spot" by chemical control" is well worth remembering in the coming years.

In the application of chemical control in the manufacture of our gas we should begin with the ultimate use of our product—the appliance in which it is burned—seeing through chemistry why we would have troubles of any kind and in turn trace these troubles back to our manufacturing process.

If we analyze trouble calls we will find these five points to be the contributing cause of all complaints:

PRESSURE.
GUMS.
SPECIFIC GRAVITY.
HEATING VALUE.
CHEMICAL COMPOSITION.

Pressure

The first of these, pressure, is the only one which can be controlled physically without the use of chemistry, but the importance of the other four greatly surpasses this since these pressure troubles can be readily recognized and quickly corrected by draining a line or increasing our gauge reading. Although this is not classed as a chemical trouble it can become chemical when sealed drips are the cause, for saturated gas causes water condensation and this condensation can even cause corrosive action and gum trouble as will be explained under the subject of purification.

Gums

Gums cause only one trouble — Stoppage—and stoppage of flow of gas through any part of an appliance causes failure of that part and other dependant parts.

Specific Gravity

Changes in specific gravity can have two specific effects upon appliance performance: change in rate at which gas is burned and variance in the composition of the air-gas mixture. Too great a change in this will necessitate readjustment of burners and sometimes change in orifice size.

Heating Value

Changes in heating value are very similar to changes in the specific gravity although the results are not directly proportional. For example: the specific gravity remaining constant, any change in the heating value will directly affect the rate of intake of combustibles but not the actual quantity of gas. The intake of air will be the same but will not then be the amount required for perfect combustion. This will then require a readjustment of the burner, and if too great a change, require change in the size of the orifice.

Chemical Composition

Variance in the chemical composition of manufactured gas is by far the most important of these five, and, in fact, it is with difficulty that the others can be separated from it.

In carburetted water gas with which this paper deals, we find the following component parts in varying amounts:

Carbon Dioxide	**Hydrogen**
Oxygen	**Methane**
Illuminants	**Ethane**
Carbon Monoxide	**Nitrogen**

When, in the proces of manufacture or purification, we change the amounts of these component parts we have then changed the heating value, specific gravity, gum formers, and possibly the percentage saturation, all of which would affect in varying degrees the combustion and action of the gas in the appliance.

For the above reason the chemist considers the Orsat Gas Analysis Apparatus the "Doctor" of the Gas plant; it can keep the patient well or it can prescribe for the sick. It might be well for the gas man to adopt the Chinese system for sickness. In China the people pay the doctor while they are well and when they get sick his pay stops until he has them well again. We could study and apply the results of the Orsat analysis while the gas is well to keep the gas well. So it stands to reason that changes in manufacturing procedure are unwise without proper chemical knowledge of the products formed.

Orsat Gas Analysis—Component Parts of Finished Gas

A record, similar to the one shown herewith, should be kept for ready reference and comparisons as far as your analysis apparatus will allow.

Carbon Dioxide

The first component, Carbon Dioxide (CO_2, is a colorless and odorless gas which has no heating value. It is formed when carbon in any form is burned in a plentiful supply of oxygen or air. Its percentage in manufactured gas is chemically important in that it points directly to whether or not we have a condition of undecomposed steam in the gas machine and also to whether or not we are blowing through our fire and into

GAS ANALYSIS - COMPONENT PARTS																		
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.	
	10	25	11	26	9	23												
Carbon Dioxide	6.5	7.2																
Oxygen	0.6	0.4																
Illuminants	8.5	10.2																
Carbon Monoxide	16.7	17.0																
Hydrogen	27.0	30.0																
Methane	14.6	11.0																
Ethane	0.0	0.0																
Nitrogen	26.1	23.0																
Sp. Gravity																		

our relief holder for too long a period. Four to five percent of this carbon dioxide is usually considered normal in coke operation and if we find by analysis that we have exceeded this amount we can begin to look for the cause. Coal operation should produce slightly more.

Undecomposed steam may result from too cool a fire or from a poor condition of the fire, as well as from excess steam. A fire in poor condition would have blow-holes through which the steam would pass without contacting the incandescent carbon thereby not allowing the transformation by chemical action of the steam and carbon into carbon monoxide and hydrogen. The remedy in either case would be to condition the fire.

Excess blow-run or purge causing excess carbon dioxide, can, of course be remedied by shortening the time of each whichever may be at fault. A pound or more of coal or coke per MCF can be wasted by 5 seconds needless purge or blow-run.

When this excess of carbon dioxide appears it does not, as a final assumption, point to our having too much steam and necessitate the lowering of the input rate of steam. Before lowering the steam rate we must consider the clinker that will be formed with too low a steam rate and adjust our operation accordingly and look for the cause of excess carbon dioxide elsewhere.

Although carbon dioxide has no heating value this is not the only reason why it should not be produced in excess quantities. The fuel consumed in its formation together with the heat loss caused by its formation should be a major point of interest. For every two parts of oxygen in the form of blast air that we put through our fuel bed at a rapid rate, we will burn up one part of coal or coke to form this useless gas.

Oxygen

Oxygen is an odorless and colorless gas, slightly heavier than air. Without oxygen animal life could not exist and no combustion of fuels could take place for this gas is the supporter of both respiration and combustion. Oxygen plays a very important part in the science of chemistry in that its presence or absence is the determining factor in the majority of chemical reactions.

The oxygen content of our finished gas should be about ½ of 1%. That is to say, we should have enough free oxygen in our gas before it is admitted to the iron oxide purifiers so that the chemical reactions removing hydrogen sulfide would consume all but this 0.5% of the oxygen present. Another important reason for the input of oxygen for purification will be mentioned later under purification. If we find the oxygen content of our finished gas to be less than 0.4 to 0.5%, air should be admitted to the gas in the proportions to reach this finished percentage. Blowing through the fire will not admit oxygen, for when oxygen contacts hot carbon we will form carbon dioxide, the oxygen having been used up in the formation. This percentage of oxygen is only for alkaline material, as the admission of oxygen to acid boxes can prove a detriment. (See under purification).

Illuminants

This name, illuminants, was decided upon a long time ago as descriptive for a group of component parts of manufactured gas known as higher hydrocarbons, further described as aromatic and olefin hydrocarbons. They gave the illuminating qualities to illuminating gas. The distinctive odor of manufactured gas is attributed to this fraction of the gas. The procedure in gas analysis to remove and separate these higher hydrocarbons is quite lengthy, and since it was found that fuming sulphuric acid would absorb these, they are so absorbed and reported in an analysis as such. They possess, by far, the greatest heating value per cubic foot of any of the other component parts. A fact well worth remembering is that they also require almost eleven times as much air per cubic foot for combustion as do the two major components of gas, hydrogen and carbon monoxide.

The list of component parts of gas which accompanies this paper will explain the heat content and air required for combustion, and this should be consulted when studying the analysis of gas. You can readily realize what would happen in the combustion of gas in a CP range if this percentage of illuminants was materially increased or decreased—the burner adjustment for air remaining the same.

These higher hydrocarbons are formed by the gasification of oils; the breaking up of the oils into hydrogen and carbon and the heats which caused gasification forming various hydrocarbons. Of course, on the back run, these hydrocarbons are passed through the fire and further changed.

We can see from this that the control of illuminants in our gas is in direct relation to the kind of oil used, the temperature at which it is cracked, and the time of contact of the oil with the heating surface. For each oil there is a proper cracking temperature and a proper time of contact which must be determined by a chemical analysis of the gas produced. In this way we can determine the efficiency of the cracking process. We have found that, in the coal and heavy oil process, a temperature of 1400°F in the bottom of the superheater gives good results without the formation of naphthalene or lamp black when using oil in the range of 14 to 18 API degrees.

As for the efficiency of cracking, a rule-of-thumb guide can be applied by observation of the wash box liquids—oily scum meaning undercracking (Temperature too low) and water and tar without scum denoting good operation. The trowel test can also be used, but the chemical analysis of the make gas and the calculation from this of the oil efficiency is definite and without guesswork.

Carbon Monoxide and Hydrogen

Both of these gases are colorless and odorless and have a heating value of approximately the same,

323 btu. Carbon monoxide differs in that it is toxic. Carbon monoxide is formed when carbon in any form is burned in a limited amount of air or oxygen, causing a partial combustion of the carbon. This allows only one part of oxygen to combine with the carbon instead of the more natural full combustion in which 2 parts of oxygen unite with one part of carbon to form carbon dioxide. Hydrogen is the lightest gas known and is formed by the decomposition of water (steam).

These two gases are formed in the fuel bed of the generator by the action of the steam and incandescent carbon, the reaction being:

Coke (Carbon) plus Water (Hydrogen & Oxygen) = Carbon Monoxide plus Hydrogen

This reaction only takes place when the carbon is in the incandescent state and this points to the fact that amounts formed depend upon the condition of the fuel bed. If the fuel bed is not in this incandescent state carbon dioxide will be formed and is a pointer toward undecomposed steam. The steam in this case would not be entirely broken up and hydrogen would not be formed in the maximum amounts.

By a consideration and study of the component parts from a gas analysis the completeness of this reaction can be definitely determined. See Gas Engineers handbook, page 274, for the complete study of this decomposition. It will suffice here to say that the amounts of hydrogen are usually greater in the analysis than carbon monoxide.

Methane and Ethane

These two gases are considered together here since they are also the products of oil cracking and are controlled at the same time and in the same manner as the illuminants. Since they are not absorbed by fuming sulphuric acid they are determined by combustion and are listed separately from the illuminants due to this.

Methane will always be formed in the carburetted water gas process but we find little or no ethane.

Nitrogen

This inert gas makes up about 80% of air. The other 20% of air is oxygen. In its free state nitrogen is very inactive as it neither burns nor supports combustion. As coal or coke contains some nitrogen (1 to 2 percent) a small part of the nitrogen shown in a gas analysis can be attributed to this but very little since it is usually formed into ammonia (NH_3) when in this combined state. The majority shown then can be attributed to the blow-run and the purge since its inertness to chemical combination with other elements and compounds at temperatures realized in the gas machine cannot affect it.

So we can definitely say when nitrogen is more than 10 to 15% as shown by analysis of our gas that the carbon dioxide will also be high denoting that the purge or blow-run is excessive; more solid fuel being consumed than the good obtained in the form of carbon monoxide produced.

		Specific Gravity	*B.t.u. Cu.ft.*	*Cu.Ft/cu.ft. of gas or vapor required for combustion AIR*	*OXYGEN*
Carbon Dioxode	(CO_2)	1.5282	....	....	...
Oxygen	(O_2)	1.1053	....	....	...
Illuminants	(C_xH_x)	*1.9500	*2550	*22.00	*4.6
Carbon Monoxide	(CO)	.9672	323	2.391	0.5
Hydrogen	(H_2)	.06959	323.9	2.391	0.5
Methane	(CH_4)	.5543	1016	9.565	2.0
Ethane	(C_2H_6)	1.04882	1781	16.738	3.5
Nitrogen	(N_2)	.9674	....	....	...

** Estimated:—composed of a mixture of aromatic and olefin hydrocarbons*

The methods of calculating oil efficiency, blue gas efficiency, and the expounding of a series of chemical formulae has not been resorted to here as this paper is more of an explanation of how chemical control can be exercised in gas making than it is a treatise on the thermal and chemical reactions and calculations. These could be extended to volumes, but due to lack of time and space reference is here made to many publications by the American Gas Association, to American Gas Practice by Morgan, and to the Gas Engineer's Handbook.

Gas Machine

All of the papers which have come to the attention of the writer on the subject of chemical control have usually been centered on the gas machine, and he is sure that all of you have this information at hand for reference.

For that reason this paper is being presented with the chemical control of the entire plant in mind rather than the already available control of the gas machine.

Mention has already been made under Chemical Analysis to the points of control within the gas machine, and this, together with the information you already have at hand, should be sufficient.

Boilers

With two instruments, a CO_2 indicator and a thermometer, you can save from two to ten pounds of boiler fuel per MCF by chemical control as pitted against physical control. By adding a concentrometer and a bottle of B & B soap solution you can prolong by years the life of your boiler tubes and drum and extend by many months the cleaning necessary within the boiler; also you can add another pound of boiler fuel to the above savings.

As little as you may have thought about the efficiency of a boiler, you can observe the savings of the period of a year when the above savings could be effected.

There are only two things to be considered in the efficiency of a boiler: Stack Temperature and % Carbon Dioxide in the stack gases. If these are right you will get the ideal efficiency from your fuels. The condition of the inlet boiler water is also of major importance.

The place at which samples of stack gases and temperatures should be taken is just above the top tubes. As this is impossible in most cases, a point in the breeching of just below the damper is good. You will find herein two tables, one on boiler losses and the other on oil burning efficiency. We have obtained good results and excellent fireman cooperation by placing a small typewritten copy of these where the fireman can see them. When an analysis is made of the gases in the stack and the temperature observed he is shown the results of the test and this has been found to give the fireman a reason for taking an additional interest in his job.

When we find the CO_2 low, this indicates that the fuel is passing through the combustion chamber without being fully burned, indicating too much draft. This draft, if not automatically controlled, should be controlled with the damper and the boiler draft doors. Low CO_2 can also mean, if using oil or tar, that our fuel is not being atomized properly and more steam may be necessary for proper atomization. This can be seen by observing smoking stacks instead of the slight haze which

is best. Deposits of soot in the stacks and among the tubes also indicates improper atomization of the fuel. Temperature of stack gases is very important since it indicates also excess draft. The combustion may be perfect with a high CO_2 content of stack gases, but if the temperature is excessive we can still have a very inefficient boiler. We depend upon the generated heat from our fire to heat the water in the tubes, but if part of this heat goes out the stack in excess we have not used it fully.

Saline Control

The concentrometer is an instrument closely resembling a hydrometer, in fact that is about what it is. The reading method, though, differs from the hydrometer in that we can read directly in grains of concentration of soluble salts in our blow-off water. This test will tell us whether or not the salines are being blown off from the boiler water in sufficient amounts so as not to form scale and cause any more corrosion than necessary. Since additional boiler fuel is required to heat up these heavy concentrations of useless materials, the concentration should be kept to around 150-175 grains per gallon in the boiler blow-off water and the blow periods should be so regulated to keep this concentration normal. In blowing off a boiler at regular intervals some may consider this as a waste of steam, but you can actually save steam by keeping the water in such a condition as not to require extra fuel. Too high a concentration of mineral salts in the boiler water can cause priming of the carrying over of water vapor into steam lines and turbines. In concentrations above 250 grains per gallon boilers are in the priming state and the concentration should be lowered by blow-offs. The pH alkalinity of this water also should be kept below 12.0 as this is the critical point for priming. This is also done with the regular blow-offs.

Water hardness used for boilers when tested with B & B soap solution should not be allowed to go beyond 5 drops for a 5 minute lather in 40cc of test water.

Boiler Losses

Flue Gas % CO_2	% Fuel Loss	
2%	75%	Poor
3%	46%	Poor
4%	32%	Poor
5%	23%	Poor
6%	18%	Poor
7%	13%	Poor
8%	10%	Poor
9%	8%	Fair
10%	6%	Fair
11%	4%	Good
12%	3%	Good
13%	2%	Good
14%	1%	Excellent
15%	0%	Excellent

Although this paper would be considered lengthy, the subject of chemical control has been covered briefly, the more complicated phases of the subject having been omitted. Some points brought out like Organic Sulfur, and the part that Carbon Dioxide plays in the formation of gums, though rather complicated, were thought to be of greater importance and were mentioned here to acquaint those with these facts who have not made a study of this phase of gas making.

Oil Burning Efficiency

CO_2 per cent	6%	8%	10%	13%
At 700°F	52% Eff.	58% Eff.	63% Eff.	71% Eff.
At 500°F	66% Eff.	70% Eff.	73% Eff.	79% Eff.
At 300°F	79% Eff.	81% Eff.	83% Eff.	86% Eff.

It's certain that we will be on a spot after the war as far as clean gas is concerned, since the trend is toward making gas a superior and ideal fuel. Even the appliances are being designed with this end in view.

So, by chemical control, "Let's keep off the 'CP Hot Spot'."

GAS MAKER'S GUIDE

Application of Chemical Test Results in Bituminous Coal and Heavy Fuel Oil Operation

STACK GASES

	Good	Fair	Poor
% Carbon Monoxide	1.0	1.2	2.0

Remedy: Increase blast pressure and shorten blast time (together)

or Decrease depth of fuel bed (if high) keeping same pressure and blast time

FINISHED GAS SPECIFIC GRAVITY

Good	Fair	Poor
.6500	.7200	.7500

Causes: Steam decomposition poor—too much blow-run or purge

Remedy: Condition fire—shorten blow-run or purge, or both

FINISHED GAS COMPONENT PARTS

	Good	Fair	Poor
% Carbon Dioxide	5.5	6.5	7.5
% Oxygen	0.5	0.3	0.2
% Nitrogen	10.0	15.0	25.0

all of the above parts of gas have no heating value and therefore give no b.t.u. to gas

Carbon dioxide increase means more COAL/MCF

Nitrogen increase means more Carbon dioxide — therefore more COAL/MCF

Remedy: CO_2—Same as specific gravity

O_2—Admit more before purifiers

N_2—Shorten blow-run and purge.

(Turn to page 30)

CRUSE-KEMPER COMPANY
AMBLER, PA.

We are working on War Equipment and supplying Essential and Emergency Requirements for the Gas Industry.

GAS HOLDERS, GAS HOLDER REPAIRS, PURIFIERS
COMPLETE GAS HOLDER INSPECTION SERVICE
41 YEARS OF SOUND
STEEL PLATE CONSTRUCTION

CRYSTOLON BRICK

For Gas Generators

High refractoriness, chemical stability, resistance to abrasion and to slag penetration make CRYSTOLON (SiC) Brick ideal for long, economical service in the generators of gas sets. The dense surface of CRYSTOLON Brick resists slag penetration so that clinkers are easily removed leaving the face of the brick clean and undamaged. This results in long life for the CRYSTOLON lining which often pays for itself the first year by savings in cleaning costs alone.

NORTON COMPANY — WORCESTER 6, MASS.

Norton Longer Lasting Refractories

Purification

Purification of manufactured gas begins in the gas machine itself. It starts with the hydrogen sulfide formed in the generator by the action of the sulfur in the coal or coke with the incandescent carbon and steam. The hydrogen from the steam reacts with sulfur in the coal or coke to form Hydrogen Sulfide; also formed is carbon disulfide from the reaction of carbon and sulfur. When hydrogen sulfide passes into the carburetter, any incandescent carbon that may be in its path presents itself in a perfect state for hydrogen sulfide to form into carbon disulfide (generally assumed to be the greater part of what is termed organic sulfur). If this carbon is kept at a minimum the reaction is retarded and the hydrogen sulfide passes on through and is easily removed by the iron oxide purifiers. But, if carbon disulfide is allowed to form it is not usually removed, since the process for its removal is not as simple as that for the removal of hydrogen sulfide and is too costly at present for general use. The actions of sulfur in the oils is similar; mercaptans of sulfur are formed which are not removed for the same reason. A chemical analysis for the grains per 100 cubic feet of organic sulfur in the finished gas will determine if this reaction is taking place, and if found to be more than 8 to 10 grains, steps should be taken to obtain a better cracking of the oil, thereby leaving slight carbon deposits. The deposits of carbon by the extra heavy oils (those of very low gravity) are controllable only to the point of their usefulness for cracking, and if excess deposits are continuous and organic sulfur is higher than usual, steps should be taken to procure oils which are more suitable for cracking. The amount of sulfur as determined by the analysis of oils is of course to be considered seriously, but you can see by the above reactions that the amount of oils that cannot be cracked at the critical temperatures of the gas machine will determine how much organic sulfur will be formed, more than small percentages of sulfur in oils will.

Hydrogen sulfide is also absorbed in some proportions by the tar made in the machine which can be evidenced by chemical tests made during distillation of tar to determine water content. This is the second step of purification.

More of the hydrogen sulfide, carried by the gas to the relief holder, is then absorbed by the water of condensation as it drops out at this point.

As the gas is then passed through the condenser, scrubbers, and other tar extractors, the tar, with hydrogen sulfide which has been absorbed, is condensed. The circulating water of the scrubbers now has its turn, and since hydrogen sulfide is soluble in water, some of it is absorbed here along with some hydrogen cyanide and cyanogen. (This absorption depends upon the then present saturation of this circulating water—if already super-saturated with these impurities it cannot take on any more). The extent of this absorption by the circulating water can be determined by the Tutwiler instrument at the inlet and outlet of the scrubbers, the gas having been first cleared of tar and vapor by filtering before admission to the instrument. Carbon dioxide is also soluble in water and some of it along with some ammonia is removed from the gas at this point.

Iron Oxide Purifiers

Since iron oxide purification is most prevalent in gas plants in this territory, this discussion will be limited to iron oxide.

In the chemical control of this type of purification, mention must be made here to the importance of controlling the pH of the purification material. This pH, or degree of acidity or alkalinity, is very important when consideration is given to the chemical reaction which takes place between hydrogen sulfide and iron oxide when an acid condition prevails and to that taking place when the iron oxide is predominantly alkaline.

Your attention is directed to page 806 of "American Gas Practice" where you will find listed the reactions between hydrogen sulfide and iron oxide. In the first reaction we note that ferric sulfide is formed if the material is alkaline and in the second we find ferrous sulfide formed together with free sulfur when the sponge is acid. (These reactions, of course, only take place in the presence of water, either in the form of moisture in the gas or from accumulated water of condensation). This formation of ferric sulfide is desired due to its property of easily being converted back to the original iron oxide by action of oxygen. By supplying enough free oxygen to the gas before it reaches the purifiers this conversion can be made to take place to quite an extent as the gas is purified and will keep the purification material in much better condition for a much longer period of time. By admitting this oxygen the material actually revivifies itself to quite an extent. Amounts of oxygen required are given under "Oxygen" which has already been discussed.

By testing the drain water from the purifiers we can obtain a fairly good idea of the pH of the sponge in the box, but the best way is to obtain some of the sponge itself and, after covering with distilled water, test this water for its degree pH. Authorities recommend that the pH of the iron sponge be maintained at around 7.5 for best results. This can be done by adding lime or soda ash to the purification material as it is placed in the box and by spreading this over the top of each layer as the material becomes acid. This method of opening the box each time alkalinity must be added is very unhandy, and those boxes having layers of material cannot be alkalized as the bottom layers cannot be reached. Also lime is only slightly soluble in water and will not be carried through the sponge to any great depth.

For these reasons it has been suggested that ammonia gas be admitted along with the manufactured gas for alkalization of the sponge. We have found this method very successful provided enough moisture is present in the material for absorption of the ammonia. When enough moisture is not present the ammonia will be useless as an alkalizing agent, passing on through as a gas. Moisture should be admitted by steaming the box during the operating period on the day before ammonia is admitted.

Alkalizing

As an example of the effect of alkalinity on the activity of iron sponge in the removal of hydrogen sulfide: One of our boxes of iron sponge had been allowed to become acid. This box was #6 on the line and had been in this position for almost 2 years. Since the records indicated that this box had never received more than 2 grains of Hydrogen sulfide per 100 cubic feet of gas, the material was known to still have great potential removal qualities. The order of this box was then reversed when new material was added in boxes 4 and 5, this change placing this #6 box in 4th position. We noticed in weekly tests that this box with 35 grains entering would remove hydrogen sulfide down to only 2 to 6 grains; this was happening even though we had added lime to

the top of the top layer and by this had caused the drain water to show a 7.3 pH. It was decided that this material should show more activity and ammonia was purchased for the purpose of alkalizing it. The box was steamed during the manufacturing period by admitting steam along with the gas entering the box, being careful not to admit too much, but just enough so that the drain water was plentiful but that gas would blow at the water outlet valve after a minute or so of draining. A 50 pound cylinder of liquified ammonia gas was used and this ammonia was admitted the next day in a gaseous form directly into the box inlet through a test cock. A total of 8 pounds of liquid ammonia was admitted as a gas and within a week this box was removing all traces of hydrogen sulfide. Later this box was placed first in line after the shaving scrubber and it was found to be removing all trace of hydrogen sulfide with 135 grains entering. Chemical control of this box saved the labor cost of removing this material and the loss of the use of this material during needless revivification.

Having 6 purifier boxes at our Miami plant, calculations were made and it was found that 4 boxes, if kept in good condition as to material and alkalinity, would take our maximum load of hydrogen sulfide. This then gave us an extra box for use as an additional shaving scrubber, thus eliminating all possibility of any tar reaching the oxide sponge.

Effect of Tar

The activity of iron sponge is greatly reduced by tar particles being admitted, even in small quantities, for each particle of tar covers a particle of iron oxide equal in size and renders that oxide inactive forever. So, if in a five minute tar camera test, you find no trace of tar entering the first oxide box, you can rest assured that your oxide in the first box will have its life as an active material increased greatly if kept alkaline. Strange as it may seem, the first oxide box usually tests alkaline without being alkalized. This can be explained in this way. Due to this material catching the first particles of water which keeps it moist, this water absorbs whatever ammonia may be left in the gas when it reaches the box, this ammonia overbalancing the acid.

Cause of Acidity

Very little information can be found in any of the gas technical books and publications relating to the cause of acidity in purifying materials. It would appear that it has been taken for granted that there are acids formed in the gas making process and they are deposited as the gas is purified and the subject dropped at that point.

This is a very important thing, and to be more definite in this matter, we should find what acids can possibly be formed from those constituents present and by a process of elimination determine the major cause of acidity.

We know that sulfuric acid (H_2SO_4) and sulfurous acid (H_2SO_3) could be formed for we have all of the component parts present, but we find that these elements are in such a state that great amounts of these acids could not be formed quickly. We also could have nitric acid formed (HNO_3) but large enough quantities to form much acidity are unlikely due especially to the inertness of nitrogen in its free state. Hydrogen cyanide (HCN) we know is formed in the gas machine and tests show its presence but in relatively small quantities.

Carbonic Acid

This leaves Carbonic Acid. This gas would be the easiest to form since we have a much higher concentration of water soluble carbon dioxide than any of the others likely to form acids (to form carbonic acid we pass carbon dioxide through water, the water absorbing the carbon dioxide as is demonstrated by the carbonated water used in soft drinks). Since this acid is the easiest formed of all of those mentioned, it is fitting at this point that the subject be further investigated. It seems that this possibility has not been taken seriously, in literature on the gas making and purification process, as being a matter of any degree of importance.

Herewith is shown a table of the activity of carbonic acid. We will apply this to our purification process and notice the various compounds that are formed by the loss of just one atom of oxygen from the carbonic acid formula. If our oxide material is starved for necessary oxygen we can expect it to grab at the most readily available source of supply, the carbonic acid, which has been formed by a part of the carbon dioxide of gas being absorbed in the water vapor of our gas.

Upon reaching this acetic acid state the further loss of oxygen turns the substance into what is called an aldehyde as it does not then contain what is known as the carboxyl group (CO-OH). The acid state is lost here.

These aldehydes are vigorous reducing agents, being easily oxydized into various organic acids; they now being as hungry for oxygen as the carbonic acid has been glad to let it go.

Formaldehyde $C\ H_2O$

Next in line in this transformation of carbonic acid would be substances formed by polymerization (the grouping together of molecules).

This formaldehyde in contact with lime or magnesia easily yields Formose (Sugars). At this point lime would cause this reaction if used in purifying material, but soda ash or ammonia would have no effect; in fact the carbonic acid would never have been formed or the reactions allowed to get this far.

Starches are formed near this point by the process of losing one molecule of WATER.

Starch $C_6H_{10}O_5$

Starches will further condense into such bodies as RESINS, INULIN, and CELLULOSE, each having a complicated formula due to this polymerization of the starch radical.

$X(C_6H_{10}O_5)$

The X representing different numbers of molecules necessary for various formations.

All of these, from cellulose back to carbonic acid, are also products of the assimilation of carbon dioxide by every day Plant Life.

Reaction Characteristics

These reactions do not require hours or days—they can all form in a short period of seconds, conditions being right. It's like a panic on Wall Street once it gets started.

Having the possibility of this cellulose formation, the acetic acid in the process of formation can easily react here with the cellulose to form

Degradation of Carbonic Acid and Acids formed from Carbon Dioxide

	Formula
Carbon dioxide in water = Carbonic acid	$C_2H_4O_6$
Losing 1 atom of oxygen = Oxalic Acid	$C_2H_4O_5$
Losing 1 atom of oxygen = Formic Acid	$C_2H_4O_4$
Losing 1 atom of oxygen = Glycolic Acid	$C_2H_4O_3$
Losing 1 atom of oxygen = Acetic Acid	$C_2H_4O_2$

cellulose acetate and be carried with our gas, as a water vapor, until condensation takes place. The water vapor at this point would contain the compound which is used for airplane dope, photographic film, non-shatterable glass, lacquers, varnishes, plastics, and rubber substitutes. All that is necessary is to present the opportunity for the substance to lose its water and CO_2 carrier. Other cellulose base substances may form, even indene, which has the formula C_6H_4CHOCH.

Indications of this reaction have been found in gas and condensate waters, and research work within the scope of our Miami laboratory is being carried on in the endeavor to ascertain if this has been taking place.

The above indicates that we can have a water-phase gum in addition to the other conventional types.

The one redeeming feature here is that this reaction cannot take place to any extent as long as the acid is overbalanced by an alkali.

Be on the safe side, keep purification material alkaline.

Another chemical fact which has been definitely proved in our laboratory is that this same carbon dioxide which we have been talking about can do other things besides form gums.

Take a small quantity of iron filings and drop them into carbonated water. This carbonic acid will dissolve the iron and the solution will continue to be colorless. The process of dissolving the iron will continue until a critical point is reached when the iron begins to drop out of the solution in the form of Ferrous oxide and Ferric oxide (the ferrous predominating). Iron will continue to be dissolved by this carbonic acid while these compounds are dropping out.

You yourself, can make this test easily. Obtain some drip water from a system which is known to have been acid for quite a long time. Water from the inlet storage holder drip would be good, or water from a storage holder itself would be ideal. Be sure the water is clear, if not filter through a filter paper. Test the acidity with a strip of alkacid paper or with a comparator. A clean water glass should be used to hold the water. Set the sample aside, open to the air for a few days. If the water sample has been removing iron oxide from your purifier box you will notice in a short period of time that the water begins to cloud, yellowish brown particles falling to the bottom and some remaining on top in sheets. If you tested the pH of the water in the beginning you will now find, after the solution has dropped all of the iron that it has become neutral or slightly alkaline when it was originally acid. If any other acid had been present the test would continue to show acid, for the other acids do not evaporate off like CO_2 does from a water solution.

Leave this glass as it now is, and set aside where it will not be shaken or moved. Observe it every week to see if anything further has happened. If the formation of cellulose acetate or other cellulose base substances have been made in the purifiers or are contained in the water vapor of the gas, some will have been dissolved in the water sample you have taken for this test, and you will find that sheets of cellophane-like material will form within the water in the glass. This usually takes about 3 weeks. Drain water from the purifier boxes will drop this ferrous and ferric oxide but the water will remain acid due to other acids that are present in small amount in the box.

Corrosion on Holders

By observing storage holders from a distance you can very nearly tell whether or not the purifier boxes in any particular plant are in an acid condition. If in an acid condition you will notice that the bottom lift is covered with a substance which looks like rust. This is iron rust but not the kind you would first assume it to be. This rust is the ferrous and ferric oxide that has been given up by the holder water as it lost its carbon dioxide at the surface of the water and has stuck on to the side of the holder. Some may stick very tenaciously and other rub off in sheets. The harder it sticks the more of the cellulose compounds have been formed in the water vapor of the gas from which it has been released.

You can readily see that this material could easily condense at the orifice of an appliance and also on meter dial glasses and within the meter itself. Also in drips and other low places in the gas lines.

Until the critical point is reached in the dissolving of this iron by the carbonic acid, the water vapor carries the iron with it wherever it goes and will condense only when the carbon dioxide is driven off by heat or

(Concluded on page 53)

THE FINAL TEST

The final test of any product is the determined desire of the customer to continue purchasing the product.

During 1944 over 2,000,000 bushels of G.P.M IRON HYDROXIDE were repeat orders.

To merit this confidence we pledge that G.P.M. IRON HYDROXIDE will continue to offer the lowest cost per pound of sulphur removal.

GPM IRON HYDROXIDE

GAS PURIFYING MATERIALS COMPANY, INC.

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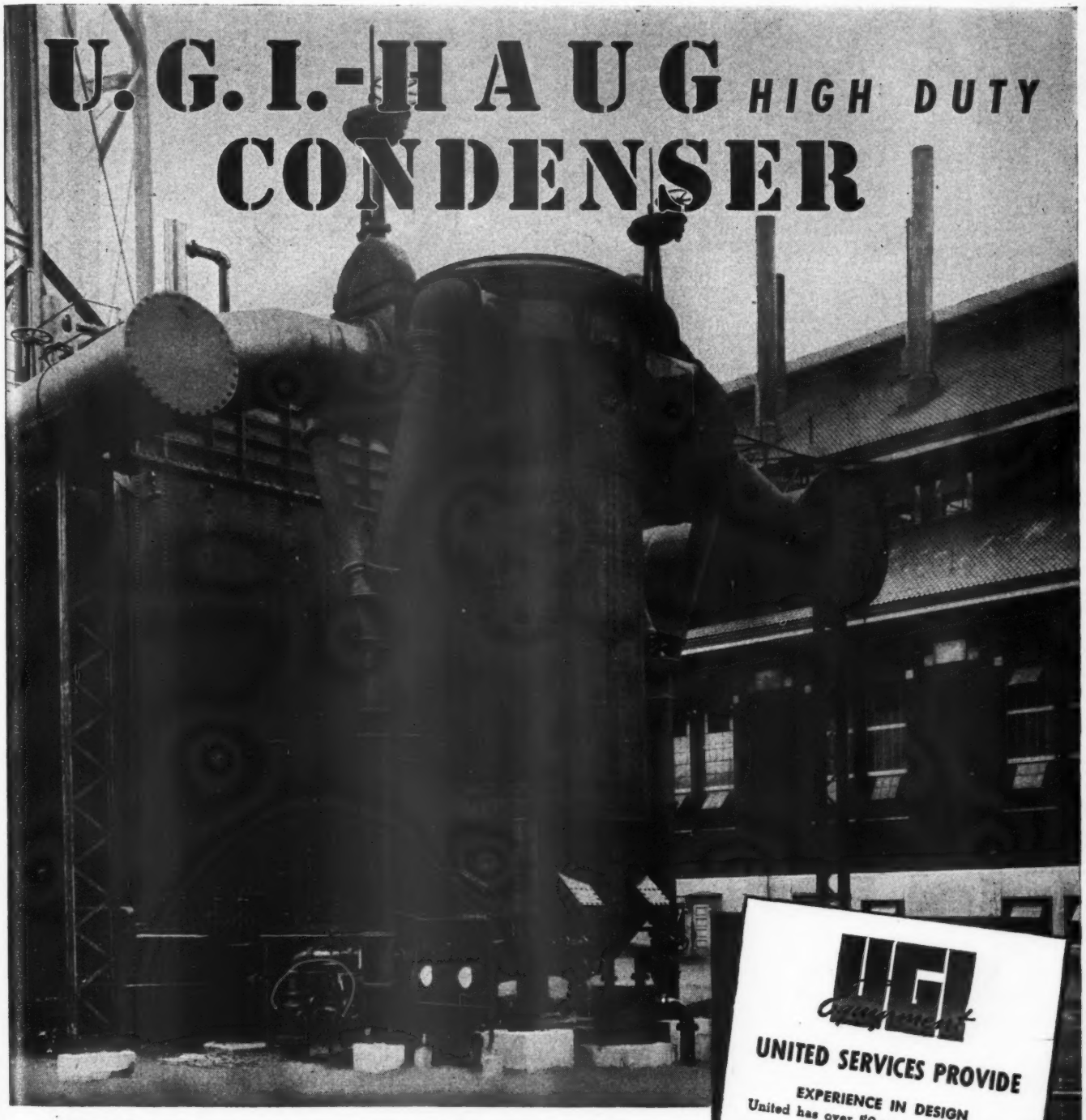

ADEQUATE condensing is an indispensable part of proper gas conditioning and provides an important step in the prevention of liquid phase gum troubles.

THE U. G. I.-HAUG HIGH DUTY CONDENSER embodies advanced principles of heat transfer as applied to the cooling of gas and offers the following advantages; High rate of heat transfer; Fresh or salt water cooling design available; Designed to meet your specific needs; Gas cooled to temperature close to temperature of water; Removal of liquid phase gum formers consistent with cooling water temperatures.

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United has over 50 years experience in gas plant design.

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United has pioneered major developments in water and coal gas production.

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United has large well organized forces for gas plant and general construction work.

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United has experienced plant operators for securing most efficient results.

UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK PHILADELPHIA CHICAGO

Post-War Merchandising and Financing

The Committee on Postwar Merchandising and Financeing, created by the Joint Accounting Committee of the Indiana Gas Assn., and Indiana Electric Assn., on Jan. 14, 1944, recently issued its final report. It is comprehensive in scope and contains valuable suggestions to all gas utilities selling appliances. The principal features of the report are recorded here.—Ed.

CREDIT has become an integral part of the peacetime American way of life. The financing of consumers' purchases through time payment plans, particularly the monthly installment sales plan, is an accepted practice not only for gas and electric appliances sold by utility companies and retail appliance stores, but also for many other types of purchases by consumers, such as their homes, farms, automobiles, home and farm equipment, furniture, etc. The committee therefore has accepted as a premise that consumer credit granted in the form of a reasonable time payment plan is a necessity and an accepted practice in the American business economy.

Factors Affecting Post-War Financing

In approaching the study of post-war appliance financing, there are several important post-war related factors to be considered which are uncontrollable by the utility industry, and which are not now determinable, but eventually will influence the terms and finance charges in the post-war period. The most important of these are:

1. The extent of redemption of war bonds by owners thereof before maturity dates for financing purchases of durable goods in post-war period.
2. Extent of Federal regulation or control over consumer credit.
3. Whether or not facilities for financing installment sales will be made available through a Federal agency, such as Electric Home and Farm Authority or Federal Housing Administration.
4. Cost of money for determining interest rate for finance charges.

Potential purchasing power is large, due to very substantial wartime savings. Just how large, nobody really knows since available statistics hardly tell the story accurately. However, a large part of the savings are in war bonds, and their widespread redemption by the owners before maturity undoubtedly would go a long way towards creating some of the purchasing power needed to start off post-war prosperity, but this would only shift the credit problem from the consumer to the government. The use of the post-war slogan "Save Your Bonds—Use Your Credit" has been suggested as having potential possibilities for influencing the holding of bonds to maturity dates. The purchases of durable goods in the post-war period from current income either by cash or a time payment plan will solve this serious problem.

Credit Selling Important

Where previously business credit was vital, today, and especially after the war, it is consumer credit that demands attention as a means of best aiding expansion and prosperity. With forward planning placing tremendous emphasis on continued full employment, credit selling is bound to play a far more important part in our economy. Federal regulation and control over consumer credit determines to a large extent the amount of down payment, maximum term, and minimum monthly installment required by installment sales contracts.

Federal regulation and control as embodied in Regulation W first went into effect in September, 1941. Originally intended to curtail demand for metallic goods and facilitate the transfer of productive resources to the defense industries, it was revised frequently and tightened until its chief aspect had become strictly anti-inflationary. With the entrance of the United States into war, the production of many durable goods was restricted or stopped. Items also were rationed. Then regulation became aimed more at reducing outstanding and consumer debt. Today this purpose seems to have been accomplished successfully.

Consumer Credit Control

There is a divided opinion among retail businesses as to the need and desirability for consumer credit control in the post-war period either in the present form of Regulation W or in an amended form. The National Retail Credit Association adopted a resolution during its annual 1944 convention that Regulation W be revised as opportunity affords or occasion demands with a view to making its administration as simple as possible and that the administration of credit should be returned to American business at the earliest possible moment consistent with the national economy.

After peace comes again there will be a period of time when the cause of inflation will continue to exist—that is, too many dollars trying to buy too little merchandise. It is the belief of this committee that adequate credit control should continue only so long as this condition exists. Early abandonment of credit control will serve to minimize the demands on the Federal Treasury for redemption of war bonds and also will make available the credit needed for post-war prosperity. With the modification or abandonment of credit control, it is the recommendation of this committee that the terms of installment sales be made to fit the credit needs. The committee believes that the liberal terms given by utility companies in the prewar period should be continued in the postwar period. Utility appliances are probably the safest finance paper in the country. People engaged in purchasing installment contracts regard it as the safest paper in their portfolio. Losses from such paper are negligible.

Aiding Dealers

There is no more important or profitable sales activity in which a utility company can engage than assisting regular appliance dealers to operate more successfully. This can

be accomplished by a policy of dealer cooperation and a genuine interest in the success of reliable dealers.

Utility companies should encourage the competition by reliable dealers. Their plans should provide that appliances will not be sold at prices lower than dealers' prices and their terms and rates for carrying charges will be exactly the same as those available to the dealers. The credit policy of the utility company likewise should be consistent with that of the dealers.

It should be the responsibility of the utility companies to know that funds are readily available for financing the sales of reliable dealers and to make arrangements with local banks or finance companies for such funds if not otherwise available. Information received indicates that there will be adequate private funds for the financing of post-war installment sales.

The committee suggested in its preliminary report that each utility company consider the benefits it will receive in improved public relations and goodwill by the financing of dealer sales through local banks.

Information has been requested from several of the large finance companies as to their post-war financing plans. The First Bancredit Corp., Commercial Credit Corp. and Associates Investment Co. have established and presented their post-war plans for financing installment sales of utility companies and reliable independent dealers. The Universal-C.I.T. Credit Corp. does not at this time have its plan completed. The plans submitted are patterned after the EH and FA plan whereby the utility companies bill and attempt collection of, to a limited extent, the monthly installments on dealer paper. The utility companies which cooperated in the EH and FA plan generally considered the plan satisfactory in its operations to both the dealers and utility companies, and should welcome the benefits from the plan when available through private finance companies.

Financing Plans Outlined

It is the understanding of the committee that these finance companies will make available other finance plans, similar to their prewar plans, excepting as to terms controlled by Regulation W, if either the utility company or the dealer does not approve of the utility company billing and collecting the monthly installments.

The following summarizes the important features of plans submitted:

1. Approval of dealers: One plan provides for approval only by the utility company. Other plans require formal application and dealers' financial and operating statements.

2. Terms: Subject to governmental regulations, maximum maturities of 36 months and 48 months on single and combination items respectively. Minimum monthly payments as low as $1.50 per month. One company quoted carrying charges of 6 per cent per annum. Other companies submitted rate charts showing finance charges based on amount financed and term of contract which show equivalent rates higher than 6 per cent per annum.

3. Recourse: One company provides for recourse only within first four months to test validity of sale. Another company provides for recourse upon default of any two installments or breach of any provisions of contract.

4. Approval of customers' credit: One plan permits the utility company to pass on customers' credit which would expedite transactions. Other plans provide for approval only at district offices of finance companies.

5. Payments to dealers: One plan

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New-day successor to old-fashioned central heating. Gas-fired, circulated warmth . . . cooling summer ventilation . . . *controlled by zones or rooms.* Flexible comfort for large or small homes.

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provides that dealers may be paid either by utility company or finance company. The utility company would of course be reimbursed by finance company. Under other plans, payments would be made only by finance companies.

6. Billing and Collecting: All plans provide for monthly installments to be billed and collected by utility companies. One plan suggests that the bills and delinquent notices be on the billhead of the finance company. Other plans provide that the billings should be on the regular service bills of the utility company. Extent of collection effort to be made by utility companies varies under the plans. Collections remitted to finance companies periodically.

7. Repossessions: One finance company makes repossessions and gives the dealer first opportunity to repurchase the merchandise after repossessed. Dealers under other plans repossess when necessary. One company provides out of finance charges a reserve of 1 per cent of original amount for contracts of 12 months or less and 2 per cent of original amount for contracts over 12 months for dealers' benefit in absorbing losses on repossessions.

8. Compensation to utility companies: All plans provide for flat rate of $1 for each account carried plus 12½ cents for each billing made or each installment collected. One plan also provides for an optional basis of compensation by establishing a reserve account for the benefit of the utility company to which would be credited 3 per cent of original unpaid balance of each contract (excluding carrying charges) and to which would be charged all losses on resale of repossessed appliances, not including repossession expenses. The excess in the reserve account over 10 per cent of outstandings would be available to the utility company as its compensation for participating in the plan. The latter plan has in every instance proved the most attractive one by a wide margin.

9. Dealers floor stock or wholesale purchase plan: Two of the finance companies have definite plans for this type of dealer financing. It is believed the other finance company also has a plan but it was not specifically requested.

10. Financial responsibility of utility companies: The utility companies would assume no financial responsibility. Their responsibility would be limited to the use of their facilities and cooperation to promote the maximum sale and use of load-building appliances.

Committee Recommendations

With reference to the post-war merchandising accounting practices of utility companies, the committee recommends that the Joint Accounting Committee give future consideration to the following:

1. The practice generally followed of crediting finance charges to merchandise revenue which results in such income being a part of operating net income. It is the opinion of this committee that income from finance charges is not operating income.

2. The practice of crediting customers' accounts with the entire unpaid balance when merchandise is repossessed, which makes it impossible to determine the bad debt experience from an analysis of the reserve for uncollectible accounts.

Bellamy Chairman of Committee on Industrial Gas Research

J. French Robinson, President, American Gas Association has appointed Charles R. Bellamy, Columbia Engineering Corp., New York, Chairman of the Committee on Industrial Gas Research. Mr. Bellamy has been an active member of the committee for several years. He succeeds John W. Batten, Detroit, Mich., as Chairman.

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LIQUEFIED
PETROLEUM GAS

AS A "STAND-BY"
OR AS A REPLACEMENT
FOR YOUR PRESENT SUPPLY

We can show you facts and figures about the superiority of liquefied petroleum gas that will surprise you. We can show you examples of gas companies who have changed over completely to liquefied petroleum gas, with more satisfactory service to their customers, and of others who have found it more advantageous to use liquefied gas as a "stand-by."

Let us make a study of your requirements, and we can give you the facts and figures.

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RECENT COURT DECISIONS
Affecting Gas Utilities

Gas Company Injury Suits

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

IN THE PAST we have in these pages consistently reviewed ordinary gas company damage suits involving injuries. In this article we shall review a series of modern higher court decisions destined to impart new and valuable law to our readers, and on distinctly different subjects of law.

Lease Contract Valid

Modern higher courts consistently held that no gas corporation may make a valid contract relieving it from all liability for injuries to others, as a result of negligence of its employes. However, a recent higher court held that all other releases against liability are valid.

For example, in Manius v. Housing Authority of City of Pittsburgh, 39 Atl. (2d) 614, reported December, 1944, it was shown that a corporation and a tenant entered into a lease contract which contained a clause that the tenant would *not* hold the corporation liable for any injury to the tenant, or the members of his household, resulting from any cause whatsoever, excepting only such injury or damage resulting from the wilful acts of the representatives, agents, and employes of the corporation.

One morning the tenant's wife was injured by an explosion while canning in the oven of the gas stove in the kitchen. Prior thereto she had noticed that gas was leaking from the oven of the stove and had requested the company to repair the same. No repairs were ever made.

In view of the clause in the lease contract the higher court refused to hold the corporation liable, saying:

"Appellant's (tenant's) covenant for the release of liability for damage arising from negligence on the part of their landlord was a part of the consideration for the lease itself."

Owner Makes Inspections

According to a modern higher court a gas company, or other owner of rented property, may forfeit all security under a lease clause by performing acts inconsistent with such clause.

For illustration, in Boyle v. Pennsylvania R. Company, 31 Atl. (2d) 89, reported September, 1944, it was shown that a corporation and a tenant made a lease contract which contained a clause to the effect that the tenant would make all necessary repairs. One day a gas explosion occurred in the building. This explosion wrecked a nearby church whose Board sued to recover $20,000 damages.

During the trial testimony was introduced which proved that, notwithstanding this clause, the corporation sent its agents monthly to inspect the premises and make needed repairs. In view of this testimony the higher court refused to relieve the corporation from damages, and said:

"The company is liable. It designed and built the plant for the specific purpose for which it was used. In addition, it undertook to make all the repairs required, visiting the plant for that purpose at least once a month, notwithstanding a covenant in the lease requiring the tenant to make all repairs."

Jury Makes Decision

If testimony conflicts, the jury has a legal right to take fully in consideration all testimony and decide against the litigant whose negligence resulted in the injury.

For example, in Isle v. Kaw Transport Company, 152 Pac. (2d) 827, reported December, 1944, it was shown that a state inspector sued for injuries sustained when he was thrown from a motor truck. He alleged that the driver was negligent in permitting the truck to move backward while the inspector was on truck.

In holding the corporation liable for $4,000 damages, the higher court said:

"There is no evidence at all that anything happened, such as a stranger tampering with the brakes. As a matter of fact, the real question submitted to the jury was whether the truck moved at all. The plaintiff testified that it did move; the driver thought it did not. The jury found that it did."

Jury's Verdict Approved

Generally speaking, the higher court will approve a verdict rendered by jury, if such decision is reasonably based upon substantial testimony.

For instance, in Davis v. Kansas Electric Power Company, 152 Pac. (2d) 806, reported December, 1944, it was disclosed that a suit was filed against a gas company for damages for personal injuries sustained by a man named Davis and for property destroyed or damaged as a result of an explosion and fire in his undertaking establishment. Davis contended that the injuries which he sustained and also the damage to his property resulted from negligence of the gas company employes in permitting natural gas to escape from the mains and get into the basement of his building.

During the trial testimony was given that about the 1st of October employes of the gas company came to Davis' place of business and asked that the gas be turned off at the meter and gave as a reason for it that the company was testing the main. A witness testified that these employes dug a hole down to the gas main and cut a hole in the pipe and attached something like a meter to it. The witness testified that an employe said "it was leaking at the rate of 156 cubic feet per hour." Further testi-

mony showed that not until almost three months later did the gas company employes return.

During the final part of the trial the counsel for the gas company conceded there had been the leakage which was found, when it made the test on October 1, of 120.1 cubic feet per hour. There were witnesses on behalf of the gas company who testified that leakage for a block would not be regarded as excessive. Other expert witnesses testified in favor of Davis that gas had escaped from the main.

In view of this testimony the jury rendered a verdict in favor of Davis. The higher court approved the verdict, and said:

"After having discovered the extent of the gas leaking from the main the morning of October 1st, defendant (gas company) had not cautioned plaintiff (Davis) that there might be gas leaking into his building or basement. Many other items of the evidence introduced on plaintiff's behalf might be noticed.... We think the evidence on plaintiff's behalf, supplemented in part by some of the evidence offered by defendant was sufficient to sustain the judgment for plaintiff."

Third Party Causes Injury

The legal rule is well established that where a gas company is charged with the duty of keeping appliances or equipment in a reasonably safe condition and such appliances or equipment, through no act of the gas company employes, become destroyed or rendered dangerous the gas company will *not* be liable to the person injured unless it appears that the gas company officials had actual knowledge of the damages, or the danger had existed sufficient length of time that such officials in the exercise of ordinary care should have discovered the danger.

For illustration, in Cline v. Evans, 31 S. E. (2d) 681, reported November, 1944, it was disclosed that a pedestrian sued the Pineville Gas Company, seeking to recover damages for injuries to her right leg immediately above the ankle when she stepped into an open tile originally placed in a public highway by the gas company employes. The tile covered a valve connected with gas lines. The lower court held the gas company liable. The latter appealed to the higher court and proved that when the tile was originally installed it was safe for all pedestrians.

In view of this testimony the higher court reversed the lower court's decision, and said:

"The defendants (gas company) cannot be held responsible for the acts of third parties in connection therewith, making the situation unsafe, until it is shown either that they had notice of that condition, or a sufficient time had elapsed when it could be said that they should, in the exercise of ordinary care, have known that their distributing system was in an unsafe condition. . . . The covering may have been removed two hours before the accident, or one day, or thirty days, or even longer; but without some evidence as to the time when the pipe was uncovered, there can be no finding of negligence against the defendants (gas company) based upon either notice to them of that fact, or their failure to exercise ordinary care to keep their system in safe condition."

Compensation vs Damage Suits

Generally speaking, an employe who elects or decides to accept compensation under the State Workmen's Compensation Act cannot sue and recover damages from his employer. A new decision was rendered which provides that this usual rule of law is not applicable where an employe is killed and he leaves children over legal age who do not elect to accept compensation.

For example, in Reidy v. Old Colony Gas Company, 53 N. E. (2d) 707, reported March, 1944, it was shown that a gas company employe was killed. He left a widow and six children, two of whom were over eighteen years of age. The widow elected to accept compensation and made application under the Workmen's Compensation Act, in behalf of herself and the four minor younger children.

Later the administrator of the husband's estate sued the company in behalf of the two children over eighteen years of age to recover damages for the husband's death.

The question presented the higher court was whether the election of the widow to take compensation under the Workmen's Compensation Act, in behalf of herself and her four younger children, barred the administrator of her husband's estate from maintaining a suit against the gas company to recover damages for the death of the husband.

The court held that he could sue for the two children who were over eighteen years old and who had not received any compensation paid by the Industrial Commission under the State Workmen's Compensation Act. This court said:

"The two older children had no election to take compensation or to share in the damages that might be obtained in the death action. Their rights as statutory beneficiaries under the death statute were unaffected by the Workmen's Compensation Act."

Automobile Accident Liability

Some few gas companies operate bus lines for transportation of passengers. Other gas companies supply transportation for employes, workmen, and the like. And all gas companies supply motor vehicles for use of inspection and service employes, as well as salesmen. Therefore, we shall review the law on this subject.

First, it is important to know that the higher courts have established the law that a company which transports passengers for compensation is a common carrier, and liable for failure to exercise the highest degree of care to safeguard such passengers. A company that supplies transportation for employes, and workmen, is a private carrier and only liable for an injury resulting from negligence. And where a gas company furnishes motor vehicles for use of its employes, or salesmen, an injured employe is entitled to recover damages only where the testimony proves that the employe was free from negligence and, also, that in some manner negligence of other company employes, who acted within the scope of the employment, resulted in the injury.

Another important point of law is that where a pedestrian is injured from operation of a motor vehicle by a gas company employe, or salesman, the company is liable *only* if the jury decides that such injury resulted from negligence, or lack of ordinary care, on the part of the employe or salesman.

Now, let us review the law, as established by a recent higher court decision, involving an injury to a passenger of a common carrier operated by a gas company.

This court stated that a common carrier of passengers, although not an insurer of the absolute safety of a passenger, must use the highest degree of care, skill and diligence for the safety of the passenger. In other words, a common carrier is responsible for the slightest negligence resulting in injury to a passenger, provided the passenger is at the time of the injury using care to safeguard himself. See Kansas Gas and Electric Co.

Brooklyn Union Gas Co. Honors Long Service

Ten men with service records of 50 and 55 years were among 196 employees who in the closing days of 1944 received Service Emblems denoting the completion of 25, 30 or more years with the company.

Also honored at year-end ceremonies were 37 employees who were cited for saving lives and performing miscellaneous other meritorious acts.

President Clifford E. Paige, speaking at presentation ceremonies in General Office, expressed warm appreciation of the contribution which employees have made to the company's progress.

IT STARTS HERE!

The photograph shows the first step in the assembly of the stuffing-box type mechanical joint developed by our members to meet the requirements of higher operating pressures in gas distribution. In the 15 years since it was tested and approved by the American Gas Association laboratory this joint has been proved bottle-tight in thousands of installations throughout the nation. An important advantage of cast iron mechanical joint pipe is the speed and simplicity with which it is installed by untrained men. Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

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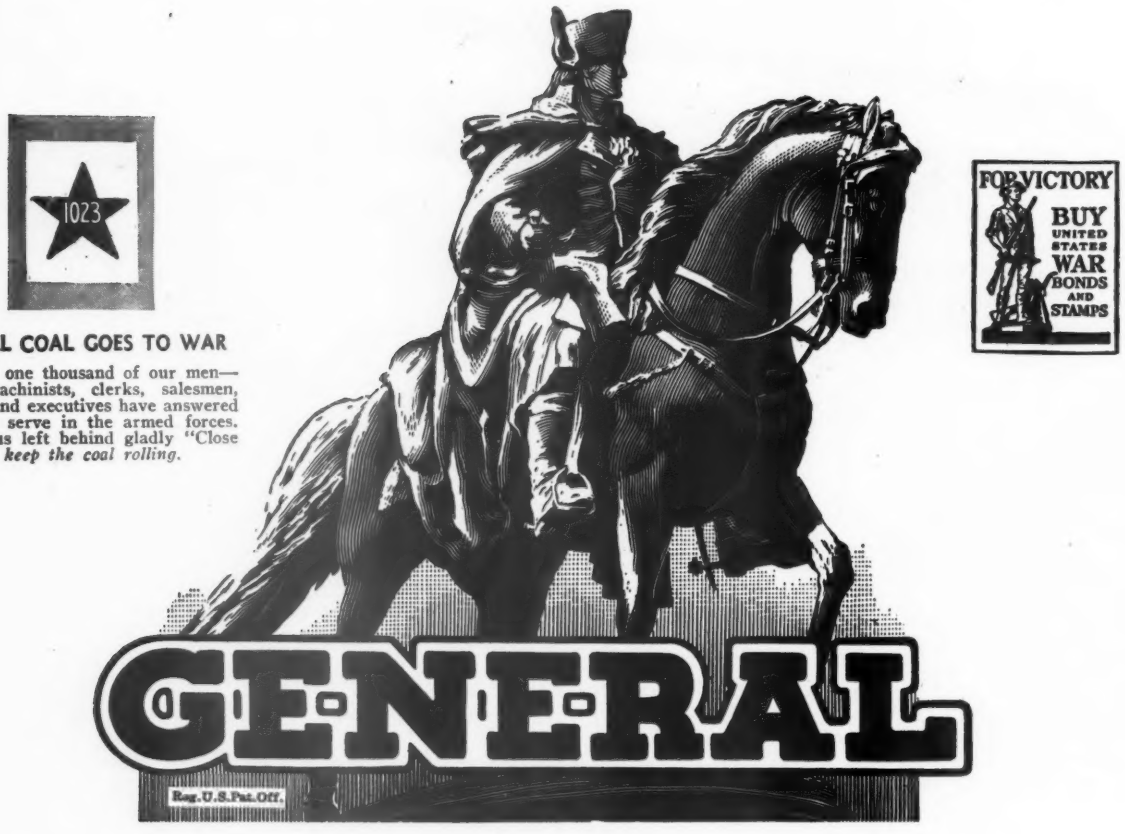
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Gas Undertakings Under Bombardment

Four and a Half Years of Endurance and Service

LAST WEEK, under conditions very different from those of a few weeks previously before the last German coastal gun had been silenced, we toured the South-East Coast, and we are now able to tell the story of what four gas undertakings—Dover, Folkestone, Ramsgate, and Deal—suffered through aerial bombardment and long-range shelling over a period of four and a half years. The experience of these undertakings has been bitter, the damage caused has been great. But throughout this weary, anxious, and distressing time, gas service—thanks to the undaunted spirit of all those concerned, disregard of personal danger, and display of resourcefulness under grave difficulties—has been given practically without a break.

Straightway let us have regard to a few figures. They are cold in themselves, but it takes little imagination to picture what they have meant to the coastal towns concerned. "Hell Fire Corner" is apt description. In that four and a half years, we were informed, over 2,000 shells (air-bursting, contact-bursting, and armour piercing) crashed into the small harbour town of Dover; from the skies about 700 high explosive bombs, three parachute mines, and seven flying bombs—to say nothing about incendiaries—found their mark on the town. Not a single dwelling escaped damage. Folkestone had 219 shells, 523 H.E.'s and 19 fly bombs (and we might mention here that 602 fly bombs were destroyed by our defences just off Folkestone's coast). Ramsgate had 42 shells and 692 H.E.'s, over 500 of which were showered in one "packet." As a matter of fact it was on a visit to the Ramsgate Gas Undertaking in August, 1940, that we had this war's bomb baptism, having had the *apéritif* of machine-gunning on our journey. The small town of Deal, with its 120 shells and 173 bombs, did not escape enemy attention. These coastal towns are scarred and battered. After an unprecedented ordeal they breathe again. Their record is in truth splendid.

Now that the veil can be lifted, we may take a glimpse of what the gas undertakings of these four coastal towns had to face.

In the December 20th issue of "Gas Journal" London, is told for the first time what four gas companies located on the South-East coast, suffered through aerial bombardment and long range shelling over a period of four and a half years. It is a remarkable story of achievement under most difficult circumstances. This is a reprint of the article.—Ed.

RAMSGATE

On Aug. 24, 1940, the Ramsgate Gas-Works had the unfortunate distinction of being the first to suffer serious damage in consequence of enemy action. At that date this was the heaviest raid which had taken place on this country, and 545 bombs fell on Ramsgate within a few minutes, 16 of which fell inside the boundary of the Gas-Works. A very great deal of damage was caused both to the manufacturing plant and the district mains. Gasholders, oil tanks, and buildings were set on fire. All the neighboring Undertakings sent men and equipment to Ramsgate to help with repairs, and by the evening of Aug. 29 gas mains and services had been attended to and a supply of gas from Broadstairs was opened on to the Ramsgate system to clear the mains of air. On Monday, Sept. 2, the works were again in production, and gas made in Ramsgate was turned on to the town on that day. The official Examiner's report showed that the calorific value was 479 against the declared calorific value of 475.

One of the holders was so perforated with splinters that 270 patches were necessary to make it serviceable.

The next occasion when damage was caused occurred on Nov. 2, 1940, when a bomb of heavy calibre fell on the gasholder site adjacent to the holder which had been so badly damaged on Aug. 24. Again the holders were set on fire, and extensively damaged, but the gas supply was resumed the same day.

On Nov. 18 three high explosives hit the works and fractured the inlet main to the holders, inlet to the water gas meter, outlet to the holders and other plant. The gas supply, of course, failed, but a small supply was turned through from Broadstairs, which had the effect of permitting most consumers to have sufficient gas. By Nov. 31 repairs had been effected and the gas supply to the town was resumed.

On the night of June 28-29, 1943, an enemy shell of large calibre fired from across the Straits of Dover detonated close to the boiler-house chimney. The two 24 in. mains under the ground at this point were shattered, and considerable damage was done to the purifiers. Once again both gasholders were perforated in a number of places and were set on fire.

Other damage of a minor nature occurred from time to time, and the last report of enemy action which affected the Ramsgate Gas Undertaking was on Jan. 20 of this year, during the time the town was being shelled by cross-channel guns. Again, one of the holders suffered and splinters pierced it in 22 places.

For his resourcefulness and undaunted spirit the Gas Engineer, Mr. R. H. Ruthven, has been awarded the M.B.E. (Civil Division).

DOVER

In Dover 72 mains were damaged by shell and bomb. Enemy shelling of this area started on Aug. 12, 1940, and during September a 14-in. shell burst within a few yards of the Company's Works, but fortunately this did no extensive damage. Another two shells exploded on the roof of the governor house and Company's Offices, a portion of the building and roof collapsed and caught fire, burying the governors in the debris and shutting off the town's supply for a short period. This incident was promptly dealt with by the Company's section of the Home Guard and other employees, who extin-

guished the flames. By their action they undoubtedly prevented more serious trouble occurring.

A gasholder of 750,000 cu. ft. capacity was, on June 12, 1941, completely wrecked by a parachute mine which landed about 100 yards away from the works. The other two holders were also damaged, and extensive damage was also caused to the works buildings. The gas supply was interrupted for a period of 5 hours; during this time it was found that gas production could be continued without the holders by using the compressors supplying the East Kent Gas Company's area to pump away the gas which was produced in excess of Dover requirements, into holders at Whitstable, 25 miles from the Dover Works. One holder has been damaged on two other occasions, and another on three occasions, once by cannon shells fired by enemy aircraft.

On Oct. 21 a shell fell alongside the gas purifiers, causing extensive damage to the sideplates and covers, and on Dec. 10, 1942, two shells fell alongside the retort house, causing extensive damage to the building, but fortunately none to the plant. There have been many occasions when shells have fallen in the vicinity of the works. Shelling continued till the silencing of the last cross-channel gun at the end of September of the present year, and during the last fortnight of bombardment the shelling was continuous. Working conditions through this ordeal can well be imagined.

In common with the other undertakings—and this, of course, has been general throughout all public utilities—at no time during the war have any members of the staff and employees failed in their devotion to duty, and work has gone on when air raids and shelling were still in progress.

During our visit we were told of many instances of individual heroism which resulted in the saving of lives, of gas undertakings' staff risking their lives cheerfully in the carrying-out of their duty—risking their lives cheerfully when "novelty of the occasion" had long since passed. Debris, debris, everywhere, with the gas man doing his part.

Co-operation

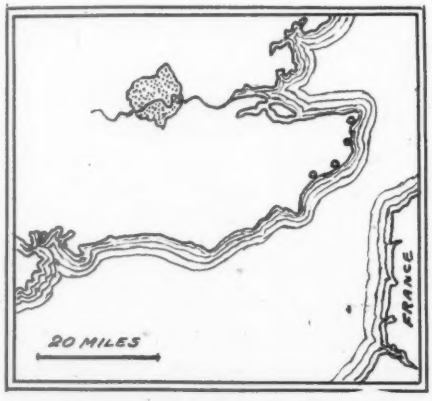
Dover knows what co-operation means in time of stress. Undertakings in the area worked as one and with a single aim. Bomb and shell damage to mains has on occasion been beyond the capacity of the Dover staff to remedy swiftly. That it has been remedied in a matter of hours is due to the mutual-aid idea put to practical test and not found wanting. Rochester and Canterbury, Whitstable and the adjacent undertakings of Folkestone and Deal, have often been on the scene to good purpose.

There is another aspect of the work which calls for mention. It is long since the Dunkirk evacuation. At that time both staff and employees of the Dover Gas Undertaking did real service as stretcher bearers, the while improvising canteens for the troops landing—and, as an incidental in an eventful life, helping in such sundries as the construction of road blocks to repel the might-be invader.

FOLKESTONE

The Folkestone Gas Undertaking's war service started in earnest in 1940, during the "phoney" period. At the beginning of the year employees spent their spare time building pill-boxes and fortifications, barricades for roads, concrete foundations for naval guns, and so on. That was before the first bomb, which, with some of its fellow-kind, fell on the East Cliff on July 6, 1940—the forerunner of 115 incidents involving damage to the Company's mains by bomb or shell. During the Battle of Britain the enemy tried with dive-bombing to demolish a holder, but the results were "near misses." On Nov. 25 the cannon shells of German fighter bombers went through the holder at Hythe. Top lift, second lift, and tank were perforated. There was fire. But no interruption occurred in gas supply.

Which brings us to the "tip and run" raids, which started on March 15, 1942, by a stick of bombs released on Sandgate by an enemy raider which very nastily came in with our own returning aircraft. Actually the worst damage to the Folkestone Works was on April 14, when fighter-bombers flying at 500 ft. found their target to the extent of breaking an 18-in. main to the western district, the 9 in. main to Hythe, and damaging the retort house, exhauster house, boiler houses, pump room, and carburetted water gas plant. A 1,000,000 cu. ft. holder, either penetrated by cannon shell or fractured by blast, was set alight. The wind was high and precluded any chance of extinguishing the flames.



The above shows location of the coastal cities in "Hell-Fire Corner" as referred to in this report. These four, from north to south, are Ramsgate, Deal, Dover and Folkestone. The dotted area is London. Portsmouth is indicated on the extreme left.

Shelling started in August, 1940, and was carried out at intervals until the enemy guns were finally silenced last September. A shell of large calibre caused serious damage to the works in the December of 1942, demolishing a holder, a scrubber, and parts of the benzole plant, and causing damage to two holders as well as numerous buildings. For their work in helping to subdue the ensuing fire, three of the staff subsequently received special commendation for gallantry. The first holder to be damaged was brought into use again in November, 1942; was hit again in 1943, this time by cross-channel shell. It was repaired and ready for use again when it was damaged last August. All is now "in order." Two other holders were damaged in 1943.

Folkestone was never without an adequate supply of gas. Why? The answer is once again easy. At all hours and irrespective of enemy fire, the Company's men were ready to work and did work.

DEAL

During the Battle of Britain there were 11 occasions when the mains of the Deal and Walmer Gas Company were broken by bomb attacks, but gas supply to the town was not interrupted on any occasion. Six "tip and run" raids were made without finding their target in the works, though the works had to be evacuated one day due to UXB. All three holders were damaged by bomb, cannon, or shell, one of them, previously twice damaged, being punctured twice in a single day—Jan. 20, 1944—and again in August of this year. Bomb, mend; shell, mend; shell, mend; shell—and now, once again, mend. And when the Company's men were not attending to local damage they were helping Dover or Folkestone. There was no respite. Shift relief men getting on in years—men who had had to contend with sickness and poor health—they all turned up for duty during raids or shelling. The community had its gas supply.

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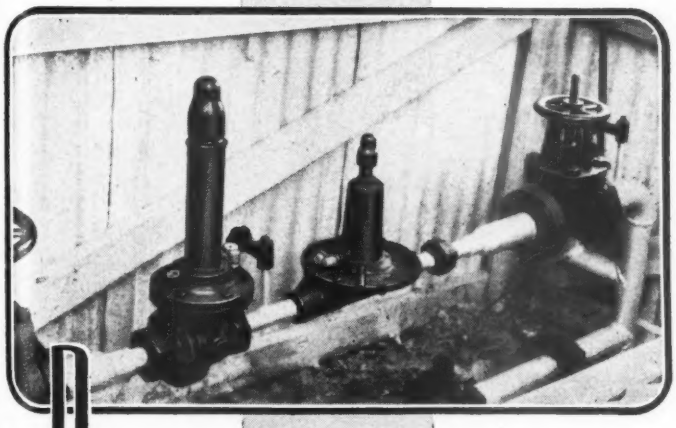

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Gas Companies Continue Satisfactory Service In Spite of a 20% Manpower Shortage

ON DECEMBER 26th, the Bureau of Manpower Utilization, War Manpower Commission, issued a 32 page case history report for the gas industry, developed by the American Gas Association at the request of the Commission.

The report covers practically every phase of gas company operation, and tells how the manpower available was used to continue satisfactory service.

At the beginning of the war most gas companies had well-balanced and capable personnel and physical properties in excellent condition. Operating practices had been developed along sound and modern lines. The companies were well prepared to assume the added burdens imposed on them by the war effort. The reason for this was efficient management and it has been that same efficient management which has enabled gas companies to maintain satisfactory gas service in spite of a reduction in manpower of over twenty per cent.

As an example of the kind of information contained in the report, we reproduce the following chapter.

Short-Cut Operating Devices

1. The use of a power driven machine to bore horizontal holes under the paved streets and railroads through which pipe is installed, has reduced necessary manpower from 15 to 4. The cost of the machine is $1,000.

2. The use of gasoline-operated hammers for digging through street pavements for small laying and relaying jobs saves the necessity of sending out an air compressor unit.

3. At a cost of $2,500 special fittings and equipment by which a section of line is by-passed and isolated so that they may be repaired or replaced, has conserved manpower.

4. For the clearing of stoppages from gas service pipes, special augers are inserted to break up and remove obstruction in the line. Equipment cost $225 resulting in a saving of manpower by not being required to open pavement and renew gas service.

5. For the clearing of stoppages* from gas service pipes by vacuum, a unit comprising 1—65 cu. ft. vacuum tank and pump with a 1 h.p. electric motor connected to a portable gasoline operated electric generator mounted on skids has been assembled for easy and quick transportation by truck to any part of our territory. When in operation a connection is made from the tank to the head of service. After a vacuum is obtained in the tank by means of the pump, a quick opening valve on the connecting line is operated and the stoppage removed from the gas service by the suction introduced. The tank was a piece of obsolete boiler room equipment but the pump with the motor had to be purchased. The gasoline operated generator is a part of our existing equipment and was not purchased especially for this purpose. Saving of manpower is created by not being required to open pavement nor to renew gas service. Plan has not been in use sufficiently long enough to give exact saving of manpower.

6. Installing gas service in trench 8 inches wide, a long handle shovel with a special blade is used in making a trench 8 inches wide across the entire width of the street. The pipe is coupled together on the roadbed, lowered in the trench where it is connected to the main and the trench back-filled. While no saving is made in company labor, a saving of manpower in repaving of streets by reason of having smaller amount of pavement open is accomplished.

7. The use of gasoline powered Badgered Hoe is saving many hours of hand ditching for pipe line.

8. In May 1944 a tractor equipped with a combination front and shovel and back-filler blade for use in backfilling main and service trenches was put in use for installing distribution systems for housing projects. About 95% of the back-filler has been done with the machine at a cost of $2,800. Based on 16,280 feet of trench backfilled to date, 2,200 man hours would have been required to backfill by hand, while the machine required only 250.

9. A small wheel type ditching machine, powered wtih a gasoline motor, with a trailer for transporting across country, costing $7,000, has reduced the necessary man power 50%.

10. By the rental of trenching and backfilling machines and a more intensive use of machines owned by the company in the installation of mains for defense housing projects, the lack of common labor for trenching and backfilling was largely overcome.

11. At a cost of $370 a power driven brush is now used for cleaning all size gas mains preparatory to applying protective coating and has saved 80 man days per year.

12. At a cost of $240 a power driven scraper was secured to clean gas mains in open trench, while gas mains are in service, preparatory to installing protective coating, and has saved 200 man days per year.

13. By replacing gasoline engine drive with electric motor drive on large pipe coating and wrapping machines at a cost of $1,000 eliminated one operator, the equivalent of 70 man days per year.

14. In the construction and maintenance of gas distribution underground facilities, an electronic stock box regulator, at a cost of $100 is used for regulating stock boxes which have been covered with dirt or pavement subsequent to installation and has saved 30 man days per year.

15. Installing gas service with Little Giant Pusher. In this operation the new service pipe is connected to the end of the existing pipe to be replaced and with the Little Giant Pusher the pipe is pulled through the earth to make connection at main. This method is very effective in reducing the amount of pavement disturbed in service work.

16. We have recently started the practice of boring under paved areas for service installation and some 2 inch main extensions. This device uses an air drill for turning the ¾ inch pipe which is used as a drill rod. A bit with 2 small holes drilled on each side is attached to the end of the pipe and water is injected at city pressure. After the bit cuts its way through the dirt, the water washes out of the spoil. The bit sizes can be varied to give holes range in size from 1 to 2¾ inches. At a cost of $350 it is estimated that a saving of

(* See article on page 14—Ed.)

8 man hours per street drill will be saved.

17. In the construction and maintenance of gas distribution underground facilities, an adjustable toggle jaw wrench for adjusting stop boxes to grate without excavation, costing $10, has saved 30 man days per year.

18. Investigations made in connection with leakage mitigation by this Gas Company, is carried out wherever possible by surface testing. The locations for these tests are determined by checking Kardex records which serve as an index to Company records, and on which is recorded date of main installation, kind of pipe and protective coating, electrical resistivity reading which indicates relative soil corrosion, pit depth readings that may have been obtained on previous maintenance checks or when services were installed or renewed. Vegetation leakage surveys are also made each year soon after the seasonal rains start. In addition to checking the condition of grass and foliage, the men making this survey check for the presence of gas in gas and water meter boxes along the parkways and by checking our own and other utilities' vaults in the streets. After the locations for surface testings have been selected as a result of checking the records and by actual survey, the Maintenance crews are assigned specific areas to cover. The crew performs this work by driving bar holes along the route of the main and sampling the atmosphere in the test holes with a combustible gas indicator. These test holes originally were made by driving a pointed bar, using the sledge hammer method, to within a few inches of the main at intervals of 10 to 20 feet. Particularly in hard soil or where it was necessary to drive through rock and oil street surfacing, this driving method was a laborious and monotonous task. There was also a hazard involved in that steel splinters driven from the bar were apt to injure the workman. A fitter on one of the crews devised an improved method of bar driving by inserting the head of the blunt ended bar in the recessed socket of the pavement breaker air hammer which was operated by pressure from the truck compressor. This method has increased the speed with which the bar driving can be done by approximately 400%. This procedure has been helpful to maintain our leakage mitigation schedule in spite of labor shortage. It has eliminated hazards of the previous method and by eliminating the drudgery connected with the work, has created increased interest and efficiency from employees performing this work.

19. By the intelligent use of standard make gas leak detectors, costing about $100, our foremen are able to locate a gas leak in a main by generally making but one opening in the street pavement where formerly several openings were required. In addition to eliminating the manpower to make the additional openings, from 6 to 2 men, we saved the manpower required to repair the opening.

20. A drop hammer, costing $11,000 installed in blacksmith shop, eliminated the use of a helper and resulted in a savings in the blacksmith's time. Saves approximately 2,000 man hours per year.

21. An air wrench was installed for the dismantling of valves and other equipment requiring wrenches, at a cost of $250. With the use of the air wrench, the ratio of the equipment to manpower is about 9 to 1.

22. We increased the capacity of our 12 ft. 0 in. set by extending the grate diameter one foot; installing new turbo-blowers for additional air to sets, thus increasing their capacity and by the erection of a silo bunker and skip hoist provided a mechanical means of handling generator fuel eliminating hand labor.

23. The use of a bulldozer is reported for the moving of purifying material for feeding of a bucket elevator in filling inside purifier boxes. While actual filling time is not changed, the use of the bulldozer and operator diverts the labor of from four to six men for at least four hours each for each purifier box change.

24. A small unloading bridge was installed so that a slicebar, motor operated, can be used costing about $30,000 and will save at least 16 man hours per day (365 days per year).

25. A device for cleaning the edges of the oven doors was installed at a cost of $9,000 and saved 24 man hours per day (365 days per year).

1945 MODEL!

Bob White

ELECTRONIC BOX LOCATER

Rapidly locates all metal utility service boxes

Curb Boxes — Street Boxes
Meter Boxes — Drip Boxes
Manhole Lids, etc.

This light weight type gives signals (even in the dark) *as fast as you can walk.*

It even locates demagnetized boxes which dipping needles cannot find.

In this new model, the amplifier case is mounted on the handle of the search coil to give more depth penetration.

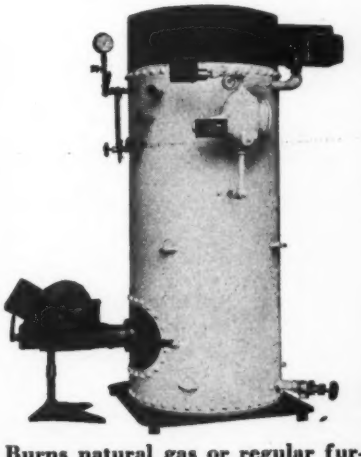
Dry cell batteries are in a separate case with leather shoulder strap.

Write for bulletin or phone for data.

Manufactured by

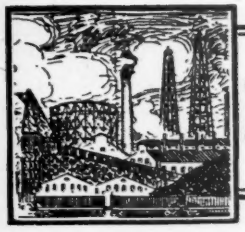
S. F. FERGUSON
11 HILL STREET, NEWARK 2, N. J.

LATTNER
GAS — OIL BOILER
3 HP to 35 HP.



Burns natural gas or regular furnace oils with equal efficiency using same burner.

P. M. Lattner Mfg. Company
Cedar Rapids, Iowa



News of the Gas Industry

Broad Research, Advertising Program of A.G.A. is Assured

In less than ninety days, gas utility companies throughout the nation have underwritten an expanded program of industry research, national advertising and general promotion, calling for an expenditure of $1,400,000 a year for three years, Ernest R. Acker, Chairman of a special committee of the American Gas Association charged with raising the funds, announced Jan. 25th.

According to a statement issued by the Association, the $1,400,000 program does not include subscriptions to be made by manufacturers of gas appliances and equipment.

The successful conclusion of the campaign will enable the gas industry to put into operation detailed plans for research, increased national advertising and the development and execution of industry-wide sales promotion programs coordinated with those of gas utility companies and gas appliance and equipment manufacturers.

When making the announcement Mr. Acker stated. "The gas industry is thoroughly aware of its post-war opportunities and plans for taking advantage of these can now be put into operation. Great advances in the development of postwar gas appliances as well as in the art of production, distribution and utilization of gas fuel are anticipated. The gas industry was never more confident of its future."

Cancellation of A.G.A. Meetings Announced

The Executive Board of the American Gas Association has cancelled in the interest of the war effort nine meetings formerly authorized to be held between the dates of February 8th and June 4. The meetings cancelled were:

Natural Gas Convention, Cincinnati, O., May 7-8.

Spring Executive Conference, Cincinnati, O., May 9.

Technical Conference on Domestic Gas Research, Cleveland, O., February 8-10.

West Coast Technical Conference on Domestic Gas Research, Los Angeles, March 7-9.

War Conference on Industrial and Commercial Gas, Toledo, O., March 29-30.

Accounting Conference, Cincinnati, O., April 10-12.

Distribution Conference, Chicago, Ill., April 4-6.

Conference on Public Utility Motor Vehicle Operation, Chicago, Ill., April 4-6.

Production and Chemical Conference, New York, June 4-6.

New Operating Division Officers NEGA

The New England Gas Association has appointed the following officers and directors for the Operating Division for 1945-46.

Chairman, G. P. Langton, Arlington Gas Light Co., Arlington 74, Mass.

Vice Chairman, Harry Eisenberg, Worcester Gas Light Co., Worcester 8, Mass.

Secretary-Treasurer, S. F. McCallister, Manchester Gas Co., Manchester, N. H.

Directors, R. B. Barger, The Hartford Gas Co., 233 Pearl Street, Hartford 4, Conn.

F. H. Faulstich, Springfield Gas Light Co., Springfield 2, Mass.

B. P. Jenkins, Fall River Gas Works Co., Fall River, Mass.

G. C. Pearl, The Connecticut Lt. & Pr. Co., Norwalk, Conn.

C. W. Rainville, Salem Gas Light Co., Salem, Mass.

T. F. Smith, Boston Consolidated Gas Co., 144 McBride Street, Jamaica Plain 30, Mass.

A.G.A. Appoints New Members of Advertising Committee

New members of the Publicity and Advertising Committee of the American Gas Association, as announced by J. French Robinson, president, are: H. K. Wrench, President, Minneapolis Gas Light Co., Minneapolis, Minn.; H. N. Mallon, President, Dresser Industries, Inc., Cleveland, Ohio; J. H. Warden, General Sales Manager, Oklahoma Natural Gas Co., Tulsa, Okla., The Chairman ef the Committee is C. A. Tattersall, Vice-President, Niagara-Hudson Power Corporation, New York, N. Y.

CONVENTION CALENDAR

April

(wk.) 9 *Midwest Gas Association,* St. Paul or Omaha.

9-10 *Midwest Power Conference,* Palmer House, Chicago.

17-19 *Southwestern Gas Measurement Short Course,* Norman, Okla. (Tentative dates.)

May

7-11 National Fire Protection Association, Annual Meeting, Palmer House, Chicago, Ill.

June

19-22 *Canadian Gas Association,* Victory Convention, Murray Bay, Quebec.

1945 Officers and Directors Oklahoma Utilities Association

President: D. S. Kennedy, Vice President and Treasurer, Oklahoma Gas and Electric Company, Oklahoma City.

First Vice President: A. F. Potter, District Manager, The Gas Service Company, Bartlesville, Oklahoma.

Second Vice President: S. I. McElhoes, Director, Public Service Company of Oklahoma, Chickasha.

Treasurer: E. C. Joullian, President, Consolidated Gas Utilities Corporation, Oklahoma City.

Secretary: Miss Kate A. Niblack, 625-626 Biltmore Hotel, Oklahoma City.

Directors: L. A. Farmer, President, Northern Oklahoma Gas Company, J. C. Happeny, President, Oklahoma Power and Water Co., E. C. Joullian, R. K. Lane, President, Public Service Company of Oklahoma, S. I. McElhoes, J. Y. Wheeler, Oklahoma Manager, Lone Star Gas Company, Sherman, Texas, W. L. Woodward, President, Zenith Gas System, Inc., Alva, Oklahoma, Glenn C. Kiley, Vice President, Oklahoma Gas and Electric Company, Frank B. Long, Vice President, Oklahoma Natural Gas Company, A. F. Potter, W. R. Thomas, Oklahoma Manager, Southwest Natural Gas Company. E. C. Joullian, is the retiring President of the Association.

Zachry Is Elected President of Southern Union Gas Co.

C. H. Zachry, who has been executive vice president and general manager of the Southern Union Gas Company, has been elected president to succeed Wofford Cain, president and chairman of the board since 1943. Mr. Cain, one of the founders of the company, will continue as board chairman and remain active in the operation of the company.

Southern Union Gas Company, a natural gas utility, maintains headquarters in Dallas and Chicago and serves about 60,000 consumers in twenty-eight cities. Prior to 1942 it was a holding company, but through mergers and consolidations required by the Securities and Exchange Commission, it has been integrated and is now an operating company.

Portable Products Corporation Acquires Tagliabue Co.

The C. J. Tagliabue Mfg. Co., manufacturers of industrial control and laboratory instruments, has sold its assets, including goodwill, name and patents, to the Portable Products Corporation of Pittsburgh, Pennsylvania.

The business will be operated as a separate division of the Portable Products Corporation. Among the interests of the latter are manufacturing plants in Newburgh, N. Y., Philadelphia and Pittsburgh, Pa.

Left to right: Robert E. Ginna, Alexander M. Beebee, and Edgar R. Crofts, recently promoted to vice presidencies of Rochester Gas and Electric.

Promoted to Vice Presidents

Three widely known executives of the Rochester Gas and Electric Corporation, Rochester, New York, were promoted to vice pesidencies, effective January 1st. They are Alexander M. Beebee, Edgar R. Crofts and Robert E. Ginna.

Mr. Beebee, who came to the company from Cornell in 1916, has been general superintendent of the gas department for several years and will be vice president in charge of all the company's gas activities. He is chairman of the A.G.A. Post-War Planning Committee.

Mr. Crofts has been assistant to Operating Vice President Joseph P. Haftenkamp and becomes vice president in charge of electric activities. He entered the employ of the company in 1916, just one month after Mr. Beebee began his duties and is also a graduate of Cornell.

Mr. Ginna has been assistant to President Herman Russell and becomes vice president in charge of rates and regulatory matters. Mr. Ginna has been active in both gas and electric industries since coming to Rochester in 1934 as manager of the rate and contract department. Before entering company employ he was engaged to make several surveys and performed other services.

Mr. Haftenkamp will continue as general operating vice president.

Shepard To Become Head Of Gas Plant

Appointment of Daniel B. Shepard as assistant superintendent at the city gas plant, St. Petersburg, Fla., has been announced by City Manager Carleton F. Sharpe. The appointment is temporary, but it is expected that he will be named superintendent when John W. Perkerson retires, after 28 years of service with the city. Shepard will qualify under civil service.

Shepard comes here from Newport News, Va., where he has been gas plant superintendent in that city for the past 12 years. He is 37 years old, unmarried, and a graduate of Virginia Polytechnic Institute, where he majored in industrial engineering.

Perkerson supervised erection of the present gas plant in 1914. He was superintendent when gas was first turned on Thanksgiving Day, Nov. 25, 1914. He continued as superintendent for 10 years and then was away for two years. He came back in 1926 and has been superintendent ever since.

R. F. Bell, Chairman of the Board, A. O. Smith Corp.

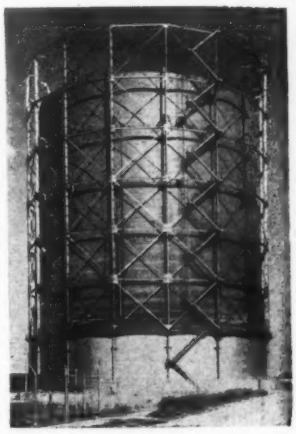
Rae F. Bell, former first vice-president of the A. O. Smith Corp. has been elected chairman of the firm's board of directors to succeed the late L. R. Smith, President W. C. Heath announced Jan. 12.

Mr. Bell was elected by the board of directors at their meeting Jan. 11. He started with the corporation in 1923 as a vice-president, and in 1937 was elected first vice-president. He became a board member in 1925.

At the same meeting Anthony von Wening, formerly a vice-president of the Continental Illinois National Bank and Trust Co., of Chicago, who joined the A. O. Smith Corp., in 1940, was elected vice-president and controller. Other officers were reelected as follows:

W. C. Heath, president; John M. Floyd, vice-president in charge of manufacturing; R. Furrer, vice-president in charge of engineering, and J. J. Stamm, secretary and treasurer.

STACEY
SINCE 1851



94 YEARS of leadership in our service to the gas industry, and more recently serving also the Government and its armed Forces with many important installations, is a record of which we are justly proud.

The gas plant equipment we design, fabricate and erect includes

Low Pressure Gas Holders of simple and sturdy design with high quality workmanship.

High Pressure Holders, either vertical or horizontal type, riveted or welded, correct in design and detail, for storage in outlying districts, peakloads and emergency demands.

Ask us about our Gas Holder Inspection Service.

THE STACEY
Manufacturing Co.
ENGINEERS
FABRICATORS
CONSTRUCTORS

Cincinnati, Ohio

GOODMAN
USED SINCE 1897
2" HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER

The Reliable Shut-Off for Street Mains

THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

Ask for circulars on this and other distribution equipment.

Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

Servel Appoints Davis to Air Conditioning Post

The appointment of R. E. Davis as Service Manager of the Air Conditioning Division of Servel, Inc., Evansville, Ind., has been announced by John K. Knighton, Air Conditioning Sales Manager.

R. E. Davis

Mr. Davis joined Servel in 1931 prior to which time he had been associated with two different Servel distributors, A. Baldwin Co., New Orleans, La., and with the Servel Distributor in Oklahoma.

Since joining the company he has served as field service engineer, export representative in Europe and the Near East, and was in charge of Educational and Service Activities on commercial gas refrigeration. He has been connected with gas air conditioning since 1941.

St. Augustine and Savannah Utilities to Merge

The Georgia Public Service Commission has approved the sale of the Savannah Gas Co. to the St. Augustine-Savannah Gas Co. for approximately $2,100,000.

A finance plan proposed by H. H. Hillier, principal stockholder of the St. Augustine, Fla., Gas Co., with which the Savannah utility is being merged, was approved by the commission after 10,000 additional shares of common stock had been provided for.

The deal must still be approved by the Securities Exchange Commission, under whose order the Savannah utility, formerly held by the American Gas and Power Co., was required to be sold.

T. O. Brown, Jr. District Manager

T. O. Brown, Jr., of Orlando, Fla., formerly of the U. S. Engineers and the U. S. Housing Authority, has been appointed district manager of the Florida Power Corporation in Sanford.

Joseph Vining, who served here several months as temporary district manager of the company, has been sent to Orlando where he is serving in the production end of the Company.

Mr. Brown is a member of the American Legion and is a veteran of World War I. He served four years in the Navy as a Midshipman and three years as a commissioned officer.

W. S. Guitteau Joins American Meter Company

William S. Guitteau has resigned as Vice President of Eastern District Operations of the Stacey Brothers Gas Construction Company of Cincinnati, Ohio, effective January 1 in order to accept an opportunity to become associated as a special representative with the engineering sales and service organization of American Meter Company. His headquarters will be at Fort Lauderdale, Florida.

W. S. Guitteau

Mr. Guitteau's first introduction to the Gas Industry was with American Meter Company when in 1903 the Midwestern Sales Representative of D. McDonald & Co., Albany, N. Y., Mr. Frederick Persons, employed him in Toledo, Ohio. He returned to the Industry as Commercial Manager from 1908 to 1909 with the Adrian Gas Light Company of Adrian, Michigan. During his thirty-six years with the Industry to date he has served almost constantly since 1914 with the Stacey Brothers organization in sales engineering and promotional activities.

As one of the principal founders of the "Gild of Ancient Supplers" he served as Mayor during 1930 and 1931 and has continued his activities on behalf of the Gild as member of the great council.

From 1924-1927 he was Manager of the Gas Holder Division of the Pennsylvania Engineering Works, returning to Stacey Brothers in 1927 as Eastern District and Export Manager of the Roots Connersville Blower Company.

Winnipeg Gas Sales Increasing

Operations of the gas department of the Winnipeg Electric Company at Winnipeg, Manitoba, continue to steadily expand under wartime conditions, according to a recent statement by company officials.

Industrial gas sales are running slightly over last year's record figures. Heavy industry continues to take a fair portion of this, but in addition the food processing industries are continuing their heavy consumption. This includes practically all of the large baking companies in all classifications of bread, biscuit and fancy cake production. Several packing houses are drawing fairly heavy for hog singeing, etc., and one large malting company continues its heavy production of a special grade of malt for the South American export trade. Numerous small additions have been added to the load, covering special heat treating processes for airplane and other equipment parts that can obtain the required results only from the very accurate temperature control obtainable from the use of gas as a heating medium.

Other similar operations are in the process of development and there is every prospect of a continuing demand for gas as a heating medium in new industrial developments in the post-war period.

SUPERIOR GAS METERS

For Sound Values and Continuous Operating Economy

Meters for Domestic and Industrial Use. All Sizes 5B to 60C.
Wet Test and Demonstration Meters — Diaphragms —
Service Cleaners — Provers — Meter Repairs

Write for details and quotations

SUPERIOR METER COMPANY, INC.

167 41st Street Brooklyn, N. Y.

M. S. Hitchcock Now Production Engineer on Ordnance Work

Mr. Murray S. Hitchcock, sales engineer of American Meter Company in the Birmingham area, has been transferred to that company's Philadelphia branch, which is under the managership of Mr. William G. Hamilton, Jr. Holding the title of Production Engineer on Ordnance Work, Mr. Hitchcock recently has been appointed Assistant Chairman of the Anti-Tank Mine Container Committee, M153, Industry Integration Committee, by the Chief of Ordnance.

M. S. Hitchcock

The Chairman of this Committee is Brigadier General R. E. Hardy of the Ordnance Department, and Mr. Hitchcock works in close collaboration with Captain Thos. F. Gibbs, who is the Ordnance Representative on the Committee, in setting production schedules and instituting technical changes.

The Committee is composed of twenty-four manufacturers located in Nebraska, Michigan, New York, Pennsylvania and North Carolina. Mr. Hitchcock renders assistance in production problems to all these Ordnance contractors and sees that the total production meets the demands of war usage.

Portable Heat to Meet Zero Weather Emergencies

The antidote for winter-locked trains, buses and automobiles and for all manner of outdoor work hitherto prevented by subzero temperatures will be generally available to the public by the time another winter rolls around.

This news came from Surface Combustion which has developed a portable heater used at Alaska air bases and for other military purposes.

Frozen railroad switches, responsible for many train delays in a cold spell, could be quickly thawed with one of the Army Air Force's portable heaters. Owners of truck and bus fleets, it is expected, will soon acquire units both to preheat cold equipment before starting a run and for wheeling out on the road to free any equipment in service which becomes ice or snowbound. Garages could provide similar service for individual motorists.

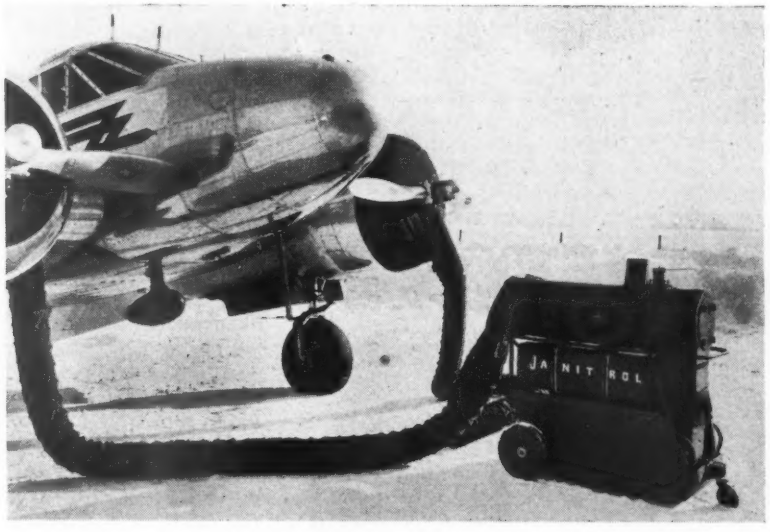
The portable heater employs the same "whirling flame" principle as the "Janitrol" aircraft heater, installed in most military planes using combustion-type heaters. The portable burns gasoline, kerosene or oil.

Military uses other than in aviation are for warming hospital tents, headquarter tents, and barracks. In the hot, moist tropics, the armed forces are using the unit for drying out workshops, keeping plane instruments free of damage from moisture while on the ground and for other drying purposes.

Chubb, Chief Gas Engineer Pacific Lighting Corp.

T. M. Chubb has been appointed Chief Gas Engineer and Assistant Secretary of Pacific Lighting Corporation, with headquarters in Los Angeles, according to an announcement by LeRoy M. Edwards, Vice President and General Manager of the company.

Mr. Chubb had been associated with the Office of War Utilities, Natural Gas Division, in Washington, D. C., as Western Area Chief for almost two years. For six years prior to that time, he was Senior Engineer of the California Railroad Commission, Gas and Electric Division. Previously, he had been in the natural gas utility business in California.



TOLEDO AIRPORT BORROWS IDEA FROM ALASKA: Arctic-like weather makes preheating of airplanes advisable. Portable heater of a type used by Army Air Forces was borrowed from Surface Combustion which developed the unit for wartime aviation. Engine nacelle and cabin are being heated simultaneously in this picture.

CLEVELAND

"A" TYPE METERS
"B" TYPE METERS
DIAPHRAGMS

Cleveland Gas Meter Co.
ESTABLISHED 1895
2009 Rockwell Ave., Cleveland 14, O. Phone CHerry 2351

CONNELLY IRON SPONGE

High in efficiency . . . low in cost. In hundreds of plants throughout the country, Connelly Iron Sponge has proven itself . . . the finest purification material on the market. Not only does it lower your purifying cost but its high activity and capacity tends to reduce distribution and service complaints because of the cleaner gas which ultimately lowers operating and maintenance costs.

If you have a problem in gas purification, Connelly's 68 years of experience is at your service. Our engineers can help you . . . there is no obligation on your part.

CONNELLY IRON SPONGE & GOVERNOR CO.
ELIZABETH, N. J. LOS ANGELES, CALIF.
3154 SOUTH CALIFORNIA AVE., CHICAGO 8, ILL.

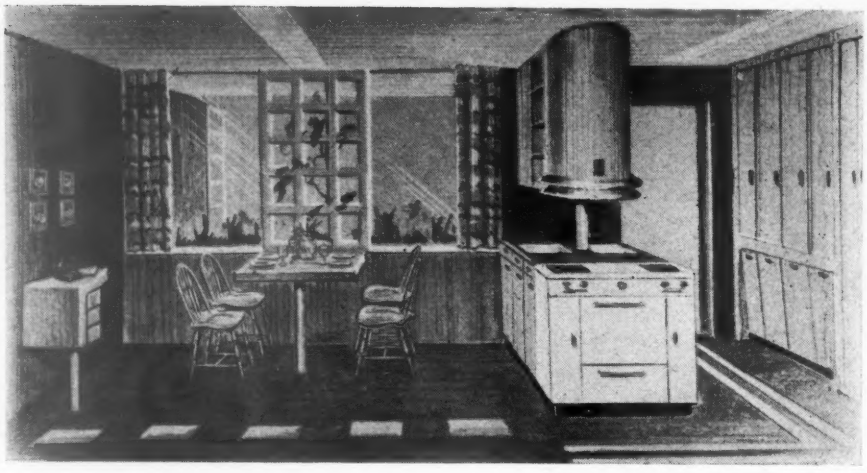
New Hardwick "Stepsaver" Kitchen

It is estimated that more than 10,000 dealers will view the new Hardwick "Stepsaver" kitchen featuring the Hardwick "CP" gas range at the Furniture Mart in Chicago during the next few months. While Hardwick does not plan to sell complete kitchens, the "Stepsaver" kitchen is a permanent display designed to stimulate dealer interest in gas ranges built to "CP" specifications, gas kitchens and all gas appliances.

In this new Hardwick kitchen, every step in the handling, storage and preparation of food logically follows in sequence until the meal is served, is eaten and the dishes have been washed and stored. Food brought to the rear door can be conveniently stored in the counter-high gas refrigerator, prepared at the sink and work space which adjoin the refrigerator, and taken to the Hardwick "CP" Gas Range.

After the meal is eaten, dishes, food and silverware are removed to the dinette side of the counters where the dishes are handily washed in the special sink in the dinette section. The dishes are then restored in the cabinets above and the silverware in the drawers below. The hanging cabinets, having no backs in them, are accessible either from the dinette or kitchen side so that glassware, chinaware, etc., can be stored or removed from either side.

Cooking odors are completely eliminated. A built-in exhaust system at the front end of the overhead cabinets to which the oven of the gas range is connected, and an open grill carries off any odors from the food cooked in the oven, broiler on the top of the range. A small fan controlled by a handy switch above the range furnishes the suction to operate this efficient ventilator.



"Stepsaver" Kitchen on display at Furniture Mart in Chicago

Estate Stove Company Announces Reappointments

Les W. Brate has rejoined the sales force of The Estate Stove Company, Hamilton, Ohio, as District Manager in the North Central territory, it was announced recently by S. C. Bernhardt, Vice-President in Charge of Sales.

As District Manager in this territory Mr. Brate will be back on familiar ground, having traveled Wisconsin and upper Michigan for Estate prior to the war. His appointment is one of the many steps being taken by Estate to build a post-war sales organization in line with their new distributor sales set-up.

Miss Celia S. Bush has rejoined The Estate Stove Company, Hamilton, Ohio, as Director of Home Service, it was announced recently by S. C. Bernhardt, Vice-President in Charge of Sales. Miss Bush, who held this position with Estate before the war, has ended a two-year leave of absence and returns to organize an expanded home service department. In addition to range testing and research, Miss Bush will prepare a home service training course and invite Home Service Directors of Estate distributors to the factory at Hamilton for a week's training with Estate Heatrola Ranges.

Les W. Brate Celia S. Bush

Vented Gas Heating

Lone Star Gas Company's campaign to educate the public in the need for venting gas heating equipment in homes is being conducted through newspaper advertising and spot announcements over two broadcasting stations.

VENT
CURE for
WALL
SWEATING
VENT HEATERS TO A FLUE.
The new heaters being designed for post-war living will be vented so stuffy air in the home can be avoided and wall sweating eliminated. Plan now to enjoy modern heat. Get new vented heaters when available.
LONE STAR GAS COMPANY

One of their series of newspaper advertisements is shown. Original size 3 columns, 8 inches high.

This campaign is in line with the address of Chester L. May, Vice President of Lone Star, presented last September at the meeting of Oklahoma Utilities Association.

BARBER BURNERS
For All Gas Appliances

S-80

Z-21

We have the facilities and experience for designing and building the exact type and size of burner unit to fit any gas appliance, using natural, manufactured, Butane or bottled gas. We cooperate with any reliable manufacturer in the necessary development and laboratory testing, and in acting as continuous source of supply for his burner units.

Latest Catalog on request.

THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, O.

COMPLETE GAS PLANTS
●
INDUSTRIAL FURNACES
●
THE GAS MACHINERY CO.
16100 Waterloo Road
Cleveland 10, Ohio

L. J. Fretwell with Oklahoma Natural Gas Co.

Mr. L. J. Fretwell joined the sales staff of the Oklahoma Natural Gas Company January 2, 1945, as Commercial Service Engineer.

A native of Baton Rouge, Louisiana, and a graduate of Louisiana State University, Mr. Fretwell has had 16 years experience in utility work, mostly in gas commercial and industrial work.

He started with the Baton Rouge Electric Company in 1928 where for two years he was in charge of customer relations, handling service complaints, and for three years industrial service engineer in the gas department handling commercial, industrial and space heating sales.

In 1933 he went to Vincennes, Indiana, and took charge of commercial, industrial and heating sales for a group of small gas properties.

For the year prior to joining the Oklahoma Natural Gas Company, Mr. Fretwell was Assistant to the Manager of the New England properties under the management of Stone & Webster Service Corporation, in Boston.

Fuels Research Laboratory

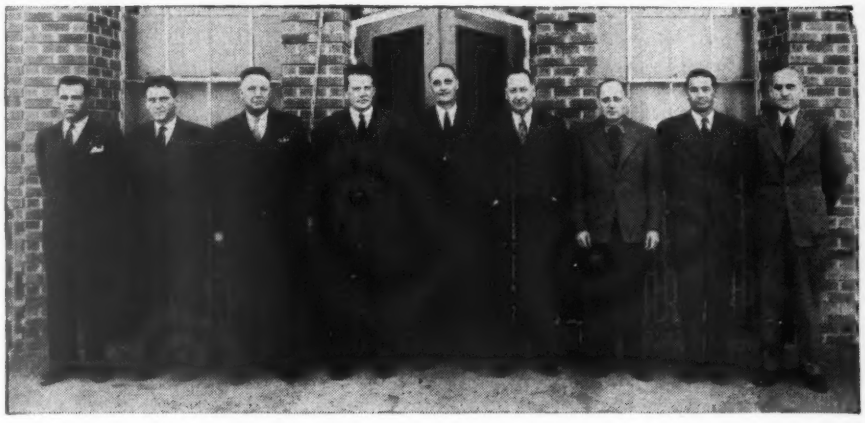
Construction of the Bruceton research and development laboratory, now under way, is a part of the five-year research program in synthetic liquid fuels recently authorized by Congress. The laboratory will work out the "kinks" in the various processes whose commercial feasibility will be proved for industry in the demonstration plants.

The laboratory will be built on a tract of Government-owned land, part of which now is being used for research activities in other fields. The laboratory and related facilities will occupy about seven acres and will include three large buildings, a power house, and several smaller service buildings.

In order to have the buildings ready for occupancy late this year, the Bureau may let separate contracts for other construction and services to speed up the job. Equipment is being ordered and will be installed as rapidly as construction permits.

This laboratory will be used to improve the processes for hydrogenation and gas synthesis employed in England, Germany, and other countries, so that the demonstration plants will incorporate the most up-to-date techniques available.

AT THE REPRESENTATIVE'S CONFERENCE, PEMCO-MERCO



Reading from left to right: W. A. Adkins, L. R. Van Arsdale, A. I. Shurtleff, R. R. Bush, F. A. Arnesen, W. R. McLaughlin, J L. Cottrell, D. D. Collins, M. D. Gilbert.

Pemco-Merco Mid-Continent Representatives Meet

The usual annual conference of service engineers covering the Tulsa territory for Pittsburgh Equitable Meter Company-Merco Nordstrom Valve Company was held at the company's branch offices and warehouse, in Tulsa, December 12, 13 and 14, 1944. Sessions were presided over by M. D. Gilbert, District Manager. Those attending are pictured above.

Louisiana to Oppose Memphis Gas Project

State officials Jan. 4th indicated that Louisiana intends to fight the Memphis Natural Gas case to the United States Supreme Court if necessary, and is ready to spend upward of $100,000 to preserve the state's natural gas reserves.

The money also would be used to set up a state organization to participate in a Federal nationwide investigation of gas resources and uses, and generally to conserve the state's supply.

Gov. James H. Davis, board chairman, described the Memphis Natural Gas case as "a critical one" for the state, adding:

"It means much. As long as they can siphon our gas to those states we'll never be able to bring industries to Louisiana, and we may not be able to hold on to what we have."

The Ohio Fuel Gas Company, Columbus, cautions its public against wasteful use of hot water so as to conserve gas. This one of a series of their recent newspaper ads in original size is 12 inches high, 4 columns wide.

CHEMISTS — ENGINEERS PHYSICISTS

Men interested in careers in industrial research are urged to write us giving details of training and experience—Essential work with promising postwar future offering opportunities for professional growth.

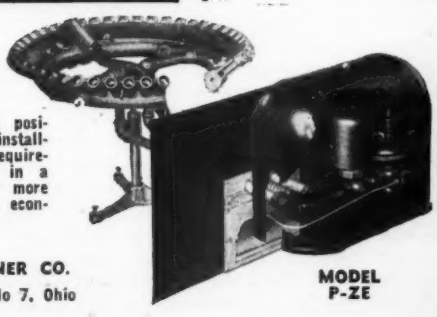
Battelle Memorial Institute
Columbus 1, Ohio

COLUMBIA CONVERSION GAS BURNERS

FOR WARM AIR FURNACES AND HOT WATER, STEAM AND VAPOR BOILERS

NU-TYPE ductless burner that performs perfectly with natural, manufactured or mixed gas.

Popular with scores of utilities and thousands of home owners. Simplifies problem of converting to gas. Tamper-proof controls, quiet operation, high efficiency, positive performance. Easily installed. Negligible service requirements. Each installation in a neighborhood sells many more because of its simplicity, economy and ease of control.



MODEL P-ZE

COLUMBIA BURNER CO.
729 Ewing St., Toledo 7, Ohio

Officers of Penna. Natural Gas Association for 1945

Following are the names of the officers of Pennsylvania Natural Gas Men's Association for 1945:

President—Dan S. Keenan, 1015 Frick Bldg., Pittsburgh.
Vice President—B. D. Phillips, 205 North Main St., Butler, Pa.
Secretary-Treasurer—B. H. Smyers, Jr. (In U.S. Service)
Acting Secretary-Treasurer—P. L. Kesel, 1015 Frick Bldg., Pittsburgh.
Executive Secretary—Mark Shields, 2619 Grant Bldg., Pittsburgh.

The following Directors were elected to serve in 1945:

C. E. Bennett, 800 Union Trust Bldg., Pittsburgh.
E. M. Borger, 545 William Penn Way, Pittsburgh.
E. J. Egan, 800 Union Trust Bldg., Pittsburgh.
H. D. Freeland, Union National Bank, Waynesburg.
D. P. Hartson, 435 Sixth Ave., Pittsburgh.
J. H. Isherwood, 78 Mill St., Port Allegany.
Dan S. Keenan, 1015 Frick Bldg., Pittsburgh.
B. D. Phillips, 205 North Main St., Butler.
H. H. Pigott, 435 Sixth Ave., Pittsburgh.
S. C. Preston, 545 William Penn Way, Pittsburgh.
G. E. Welker, 308 Seneca St., Oil City.

The following Honorary Members of the Board of Directors were elected:

T. B. Gregory, 800 Union Trust Bldg., Pittsburgh.
F. F. Schauer, 435 Sixth Ave., Pittsburgh.
George Wittmer, Jr., 1743 Oliver Bldg., Pittsburgh.

Zinder and Hilt Join Staff of E. Holley Poe and Associates

H. Zinder, who for the past seven years has been Chief of the Division of Rates and Research of the Federal Power Commission, has joined the staff of E. Holley Poe and Associates as a Senior Associate. During his seven years with the Federal Power Commission Mr. Zinder was responsible for the direction and supervision of the Commission's activities involving both gas and electric rates. This involved the handling of all gas and electric rate contracts filed with the Commission and engineering and rate work in connection with formal rate cases before the Commission and the handling of the engineering and rate phases of applications by natural gas companies for certificates of convenience and necessity for new construction, abandonment of facilities, mergers, etc. For several years Mr. Zinder was also responsible for the direction and supervision of the Commission's statistical activities.

Mr. Zinder has spent 20 years in the public utility field most of which has been in the field of state and federal regulation and in the public service. He was called to participate in the initial formulation of policies as to rates and as to the design of rates for such federel projects and programs as the Tennessee Valley Authority, Electric Home and Farm Authority, Rural Electrification Administration and others. He also initiated courses in public utility rates both at Northwestern University and in the Graduate School of the Department of Agriculture where he lectured on the subject and also on Public Utility Operation and Management at Northwestern University.

Luis Hilt, librarian of the American Gas Association, resigned January 1 to join this organization:. A member of the A.G.A. staff for more than 20 years Mr. Hilt had built up the Association's library until it ranks as the most complete gas technical information center in the country. He also set up and supervised the central filing system which has been in effect for many years.

In addition to answering thousands of inquiries from gas industry members throughout the world, he has prepared many valuable bibliographies.

Bergh Appointed Division Manager for Roper

Romus T. Bergh, during the last 15 years Roper representative and district manager in Arkansas, Kansas, Missouri, Oklahoma and part of Louisiana, will also be responsible for Roper gas range activities in Iowa, Nebraska, and Moline, Rock Island and East Moline, Illinois. The new arrangement has been necessitated by the recent death of District Manager T. E. Rooke.

While placing Iowa and Nebraska under Bergh's direction, Roper management has transferred all of Louisiana to the jurisdiction of representative D. S. Sharpe. The three western tiers of counties in Nebraska will be handled by V. T. Miller.

Girdler Corporation Elects G. O. Boomer, Pres.

George O. Boomer has been elected President of The Girdler Corporation, Louisville, Ky., succeeding Walter H. Girdler, Sr., who died on January 7. He will also remain Vice President and a member of the board of directors of the firm's affiliate, Tube Turns, Inc.

Mr. Boomer has been a member of the board of directors of The Girdler Corporation since it was founded, and Executive Vice President since 1938. He was formerly Vice President of the Ewald Iron Company and President of the Pittsburgh Fuel Company.

The Girdler Corporation has three divisions: The Votator Division, the Gas Processes Division, and the Thermex Division.

Earl Smith Heads Atlantic City Gas Co.

Earl Smith, formerly general superintendent of Atlantic City Gas Co., has been elected president of the company to succeed Robert W. Wiederwax who died on Dec. 6, it was announced by Public Service Corp. of New Jersey, the parent company.

Care for the Tired Truck

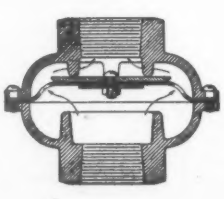
Produced especially for truck operators during this period of extreme heavy duty tire shortages, The B. F. Goodrich Company, Akron, Ohio, recently published a chart which can be used as a wall poster as a constant reminder of the necessity for tire care. Any reasonable quantities from fleet operators or truck owners can be obtained upon request.

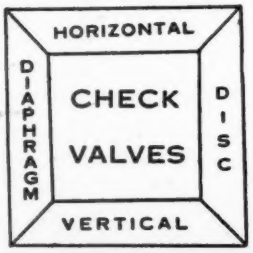
Graphically picturing the subject, the chart gives seven rules for tire care. They are: Don't Overload; Don't Exceed Victory Speed; Don't Overinflate; Don't Underinflate; Duals Must be Twins; Drive Carefully; and Correct Mechanical Defects.

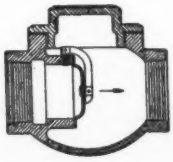
In pocket-size format, a 96 page handbook which has just been published is now available upon request. It is filled with pertinent data on each of the tires which the company makes for commercial service. This data is in condensed, easy-to-read form, and follows the description of the individual tire itself, so that no time need be wasted in looking for the information. A comprehensive index increases reading ease.

Undoubtedly the most important feature of the handbook, at a period when every effort is needed to prevent a breakdown of motorized commercial transportation, is the section dealing with the eight factors which affect truck tire life. These factors are listed as: loads carried, air pressure, speed, matching of duals, load distribution, rims, size and condition, wheels, brakes and springs, and how the vehicle is driven.

Pressure Controls for Gas and Air







NORWALK VALVE COMPANY
85 Spring St. South Norwalk, Conn.

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Cleaning Building Services

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The trapped services are the results of settlement due to many years of sewer construction.

Services that give continuous trouble are renewed to 1½" size with larger tap hole.

Appliances are checked for adjustment after the supply of gas has been re-established.

High pressure services are ¾" and 1" with maximum pressure of 12 pounds.

We carry a ¾" garden hose 30 feet long, one end of which we attach to the service tee. The other end is carried out a cellar window and the force of the gas blows out the rust or water. In the case of water, we attempt to catch it in a milk can to prevent possible odor in the neighborhood.

It is the practice to blow High Pressure services before setting or turning on a meter.

Low Pressure services are cleared out with the Vacuum Tank if we have to enlarge meter and connections to take care of increased demand.

Purification

(Continued from page 32)

allowed to evaporate by a release of the pressure. It can be carried in this way to the burner of the appliance. The cellulose materials can also be carried right along with this water in the same manner, as it is also in the water solution.

It should be clear at this point why carbon dioxide is considered one of the major causes of corrosion, since it actually eats up the iron without showing itself to be the thief.

The redeeming feature in this case also is that, even when this iron is dissolved in the carbonic acid, it can be easily precipitated by any alkali. If the carbon dioxide is overbalanced by an alkali in the purification material it will not have an opportunity to pick up this iron and carry it over the system.

To again be on the safe side, keep purification materials alkaline.

Presented before the Technical Session of the Florida-South Georgia Gas Meters Association at Orlando, Florida, November 4, 1944

American Meter Co. Honors 25-Year Employees

Presentation of certificates and emblems was made recently to fifty-six workers of the D. McDonald & Co. Works of American Meter Company who have been with the company's Albany, N. Y., plant for twenty-five years or more. Norton McKean, president and general manager of American Meter Company, announced the organization of a "Twenty-Five Year Service Guild," formed to honor those employees.

The fifty-six whose services were commemorated have a combined employment record of 1961 years. The oldest employee, Bernard H. Holtslag, has been a meter maker for fifty-eight years. A close second, James Amesmaier, has a record of fifty-four years of service.

Roper Corporation Appoints C. Edwards Adv. Mgr.

"Cy" Edwards, who for the last 9 years has supervised advertising of the Pump division of the Geo. D. Roper Corporation, Rockford, Illinois, has been appointed advertising manager of all Company activities, effective January 1, according to an announcement by Roper vice president E. Carl Sorby.

Through his long association with range as well as pump advertising problems, Mr. Edwards is well equipped to carry out plans for maintaining a well-rounded program to assist all Roper customers.

War Production Board

and Other Administrative Orders

Part 1001—Tin

General Preference Order M-43, as Amended Dec. 30, 1944

Schedules

Pursuant to the foregoing order, tin may be used only in the production of the items and for the purposes set forth in these Schedules, subject to any limitations, restrictions or conditions specified with respect to any such items or purpose and then, only to the extent that substitution of either a less critical material or one of lesser tin content is impracticable.

Schedule I—Miscellaneous

15. Equipment for preparing and handling food. * * *

(ii) To coat or retin equipment used in the processing or cooking of any food, but only such equipment as actually comes into contact with food.

Schedule II—Solders

(a) * * * ; and no manufacturer or wholesale distributor of solder shall deliver any solder to any user, and no user shall accept delivery of any solder from any manufacturer or wholesale distributor, unless the user shall have furnished the manufacturer or wholesale distributor with the following certificate.

The undersigned purchaser certifies, subject to the penalties of section 35 (A) of the United States Criminal Code, to the seller and to the War Production Board that the tin contained in the material covered by this order shall be used solely for the purpose listed in schedule of General Preference Order M-43, or is to be incorporated in an "implement of War" and the tin content of the material has been definitely specified.

(b) In the manufacture of solder, the tin content by weight shall be limited as follows, according to the purpose for which it is to be used:

3. Solder containing not more than 50% tin by weight may be used for the following.

* * *

(b) Manufacture, maintenance and repair of refrigeration equipment, not including, however, coating such equipment or soldering the seams of ice cans.

(d) Manufacture and repair of any type of indicating, recording, measuring or controlling instruments and their associate control valves, excluding manufacture and repair of gas meters which are provided for in paragraph (5) (g)

4. Solder containing not more than 40% tin by weight may be used for the following:

(a) Manufacture and repair of all galvanized iron or zinc tanks.

(b) * * *

5. Solder containing not more than 35% tin by weight may be used for the following:

* * *

(b) Manufacture and repair of tanks (except galvanized and zinc tanks).

* * *

(d) Manufacture, assembly and repair of galvanized iron items (except tanks) where the assembly is done with a "soldering iron."

(e) Manufacture, maintenance and repair of electric motors, generators, armatures, electrical equipment and appliances.

(f) * * *

(g) Manufacture of gas meters. (For the repair of gas meters in accordance with Schedule V of this order—not more than 38% tin by weight.)

(h) Wiping lead sheathed cable joints or lead pipe joints.

8. Solder containing not more than 3% tin by weight may be used for the following:

(a) Repair of automobile bodies and fenders—solder to be derived from secondary sources only.

* * *

Schedule V—Use of Tin to Repair Gas Meters

(a) *Restrictions on use of tin in certain gas meters.* No person shall use tin-bearing solder or other tin-bearing material in the adjustment, internal repair, or re-sealing of any tin-cased gas meter having a rated capacity of less than 300 cu. ft. per hour except:

(1) A meter which is found not to be accurate within an accuracy range of plus or minus 4% when tested by standard meter prover tests;

(2) A meter which has not been previously repaired internally for twelve years or more;

(3) A meter which has developed an opening through which gas escapes in the outside case or connections; or

(4) A meter which has a functional defect other than mere failure to register accurately within the range specified in subparagraph (a) (1) above.

(Sup. Order M-43-b, Revocation)

Section 1001.3 Supplementary Order M-43-b is hereby revoked, certain of the provisions thereof having been incorporated in Schedule V of M-43. This action shall not be construed to affect in any way any liability or penalty incurred under M-43-b.

War Manpower Commission

The War Manpower Commission announced Jan. 16th a list of essential and critical activities to be used by Selective Service as a guide in the induction of men in the 26 through 29 age group, in accordance with the directive issued by James F. Byrnes, director of War Mobilization and Reconversion.

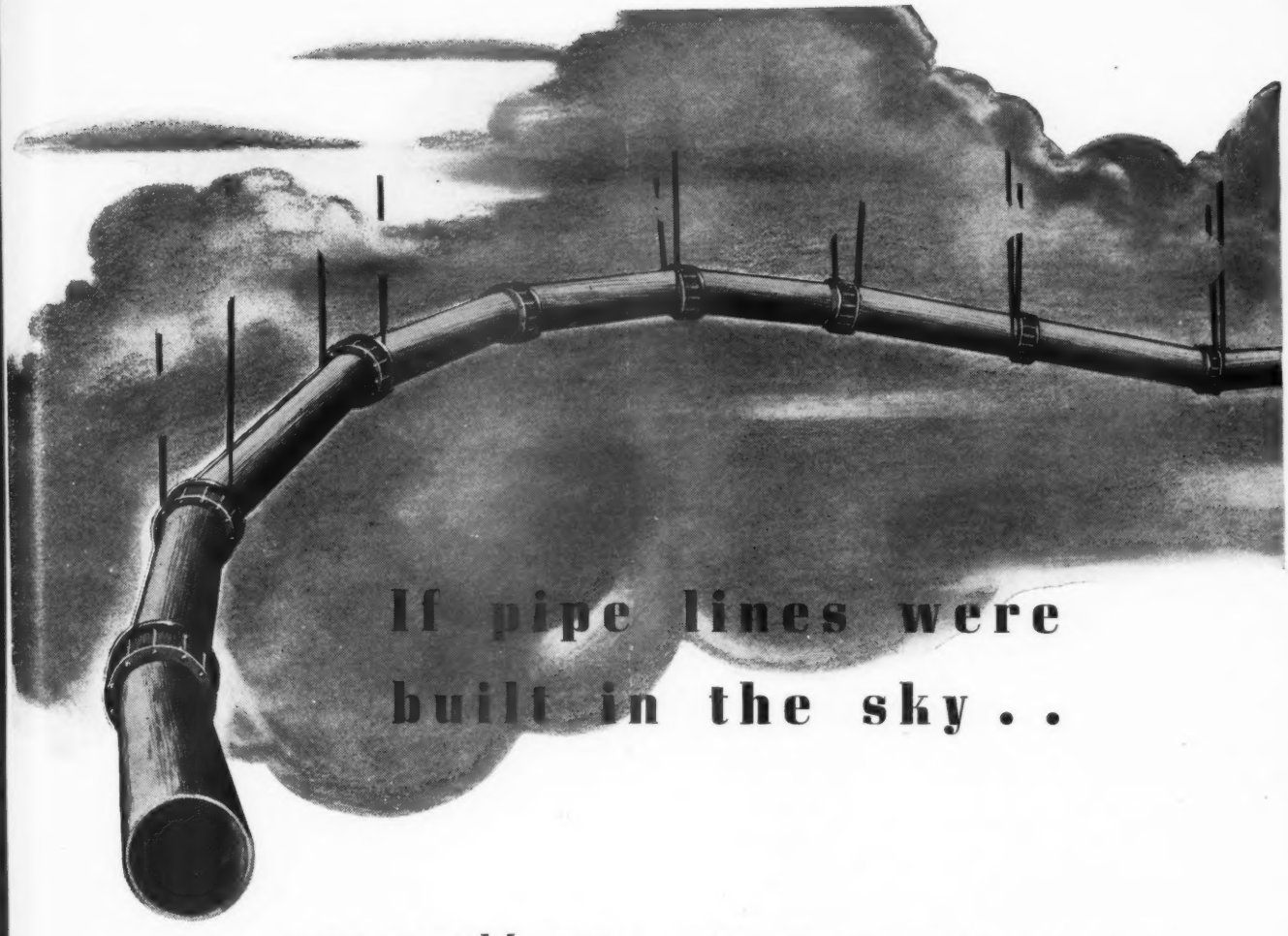
The list was drafted after consultation among representatives of the Army, Navy, Selective Service, War Production Board and the War Manpower Commission.

All activities in this list are essential activities. Those activities printed in capital letters are critical activities. With one exception, no attempt has been made to indicate the relative importance of different occupations in these activities. All Technical, Scientific and Research Personnel engaged in any of the activities in the list, whether or not the activity appears in capital letters or small letters, are regarded as being engaged in critical activities.

Listed below are those classifications effecting various activities of the gas industry.

Production of Petroleum, Natural-Gas and Petroleum and Coal Products — Explorations, drilling, rig-building, production of petroleum, natural gas, and gasoline, and field service operations, and petroleum refining. Production of tar and pitch, coal gas, coke, and liquefied petroleum gas.

Heating, Power, Water Supply and Illuminating Services — Electric light and power, water, and gas utilities: steam-heating services; sewage system; tree trimming for power and communication lines; water-well drilling (industrial and utility water supply); installation and servicing of liquefied petroleum gas facilities.



If pipe lines were built in the sky . .

. . you would see that pipe lines are alive with movement . . . squirming, twisting, expanding or contracting, as they conform to forces acting on them. You would see that a pipe line moves and "breathes" and it can do this *without setting up dangerous stresses* because of the strength, resiliency, and permanent tightness of Dresser Couplings.

Gas lines, laid in the earth, conceal their life movements from our eyes. The stresses accumulating along the pipe are hidden—but these stresses must be withstood to assure successful operation of the line.

Because of the resilient gasket seal of Dresser Couplings, the stresses accumulating in pipe lines no longer are a problem.

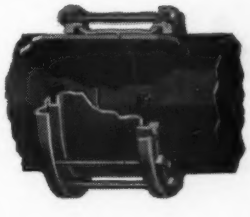
Dresser can furnish the correct coupling for any pipe line . . . as it has done for more than six decades. Consult Dresser on your pipe line problems. The most complete set of pipe line data in the world is at your service.

Dresser Manufacturing Division, Dresser Industries, Inc., Bradford, Pa.; Houston Office and Warehouse, 1121 Rothwell Street, Sec. 16, Houston, Texas; in Canada: Dresser Manufacturing Company, Ltd., 60 Front Street, West, Toronto, Ontario.

Dresser Couplings for Gas Pipe Lines

The standard Dresser Coupling, Style 38, has not undergone any radical design change since it was first installed on a gas pipe line near Malta, Ohio, in 1891 (which is still in operation today).

The pipe is permitted a longitudinal and angular movement by two resilient gaskets under compression . . . providing tightness and flexibility for decades of reliable, maintenance-free service.



DRESSER COUPLINGS

for Plain-End Pipe

meters and regulators

INDIVIDUAL OR COMBINATION UNITS

CARNEGIE LIBRARY
FEB 13 1945

Not a P... wa... dream ... but an actuality

THE SPRAGUE METER CO. BRIDGEPORT, CON

DAVENPORT, IOWA • LOS ANGELES, CALIF. • HOUSTON, TEXAS • SAN FRANCISCO, CA